F·A·A·M facility for airborne atmospheric measurements

FLIGHT FOLDER

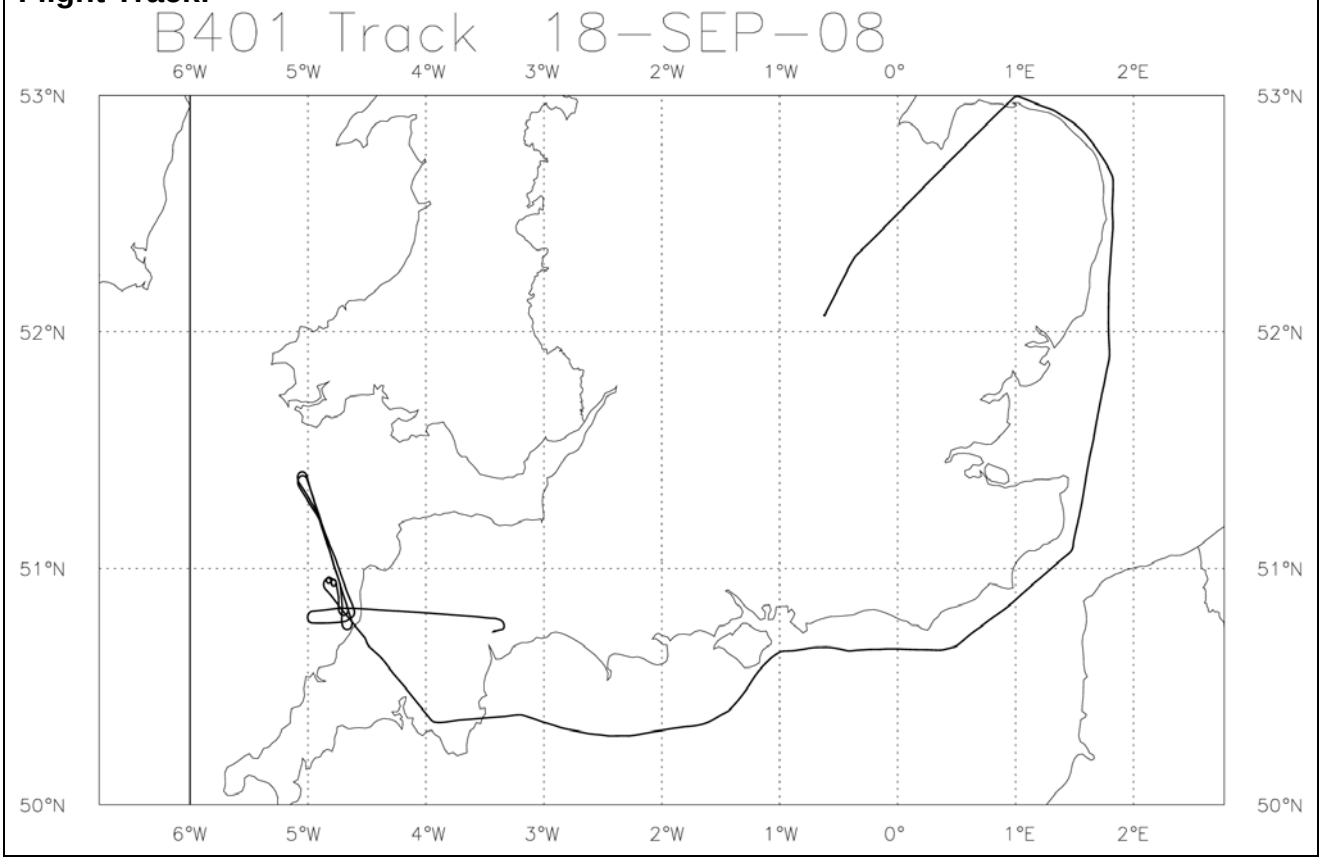
Flight No.	B401
Date:	17/09/08
Take Off:	13:33:51Z
Landing:	17:06:25Z
Flight Time	3h 32m 34s

Campaign:

Operating Area:

POB	Position	Name	Institute	Logs y/n
1	Captain	Alan Roberts	Directflight	
2	Co-pilot	Ian Ramsey-Rae	Directflight	
3	CCM1	Dawn Quinn	Directflight	
4	Mission Scientist	Simon Osborne	Met Office	Y
5	Flight Manager	Mo Smith	FAAM	Y
6	Core Chem / CCM2	Kate Turnbull	FAAM	N
7	Cloud Physics	Phil Rosenberg	FAAM	Y
8	Wet Neph / PSAP	Dave Tiddeman	Met Office	
9	CVI	Jeff Norwood-Brown	Met Office	N
10	SWS/SHIMS	Martin Glew	Met Office	Y
11	AMS / SP2	Gavin McMeeking	University of Manchester	N
12	TAFTS	Ralph Beeby	Imperial College	N
13	MARSS / DEIMOS / Mission Scientist 2	Dave Pollard	Met Office	N
14				
15				
16				
17				
18				

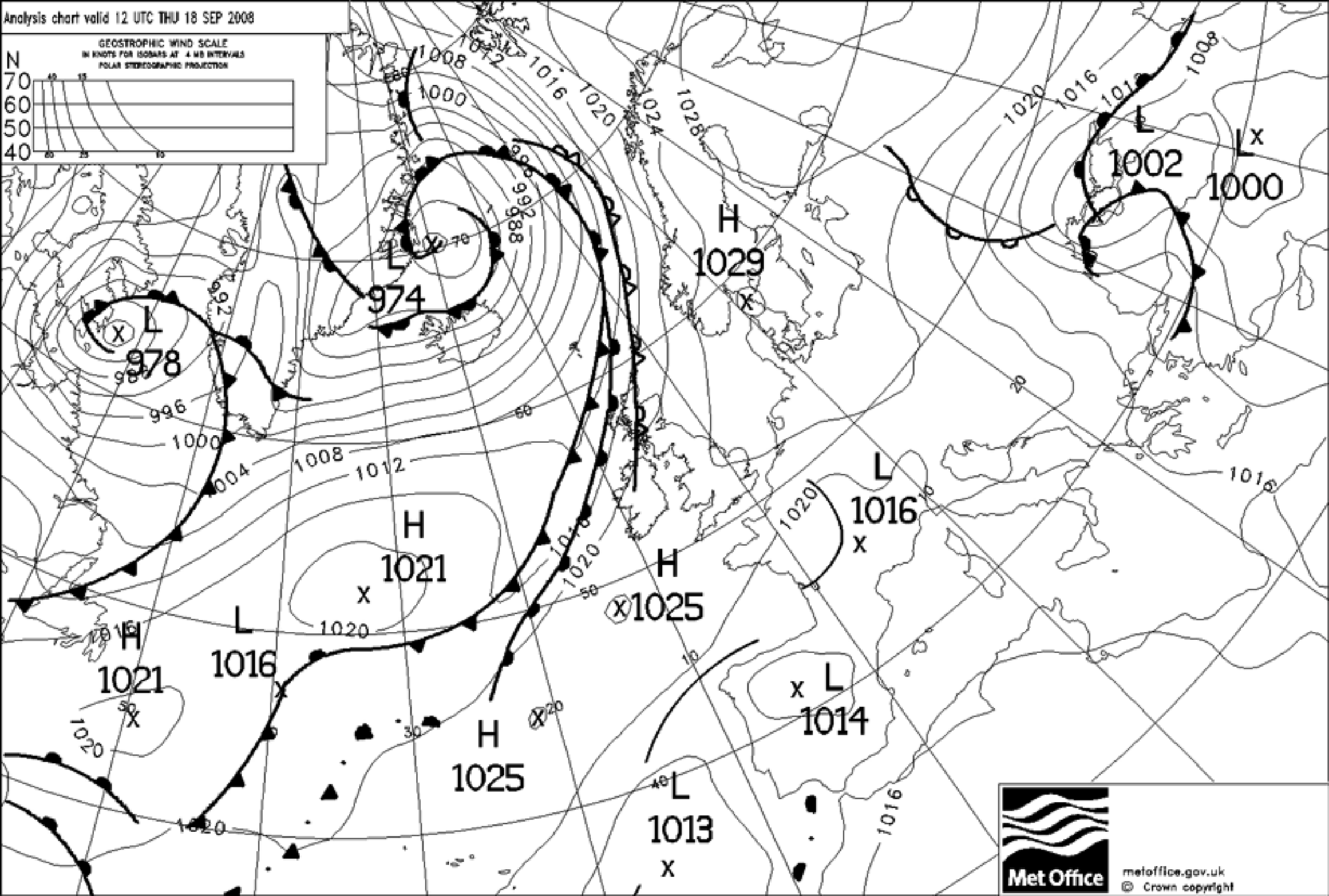
Flight Track:



FLIGHT SUMMARY

Flight No B401
Date: 18 Sept 2008
Project: ADIENT
Location: Bristol Channel, English Channel, E Anglia

Start Time	End Time	Event	Height (s)	Hdg	Comments
125443		Start-Up	-.19 kft	263	50'44.15N, 3'25.11W
133111		ASP	-.18 kft	258	Open
133351		T/O	3.9 kft	274	Exeter
133950		JW & Nevz	9.2 kft	275	Zero
134427	135509	Profile 1	10.0 - -.22 kft	274	To 50'
135609	140611	Run 1	0.34 - 0.21 kft	334	Abm WP48, 500'
140612	140841	Profile 2	0.21 - 2.7 kft	338	500-3k'
140842	141841	Run 2	2.7 kft	142	3k', WP49-48
141841	142101	Profile 3	2.7 - 4.7 kft	159	3k-5k'
142101	143045	Run 3	4.7 kft	007	5k' WP48-49
142223		Event	4.7 kft	356	Water on RFC window
143046	143401	Profile 4	4.7 - 1.8 kft	341	2k'
143401	144159	Run 4	1.8 - 1.7 kft	142	WP 49-48, 2k'
144207	144415	Profile 5	1.7 - 0.24 kft	161	500'
144416	144542	Run 5	0.24 - 0.23 kft	359	500'
144542	144657	Orbit 1	0.30 - 0.22 kft	103	50deg left
144732	144845	Orbit 2	0.30 - 0.28 kft	279	50deg, left ,start 270deg
144925	145327	Profile 6	0.32 - 5.0 kft	179	From 500'
145402		Event	5.0 kft	132	Transit 240KIAS
150344	150926	Profile 7	5.0 - 0.25 kft	083	500', WP46
150953	154550	Run 6	0.21 - 0.27 kft	095	500'
152851		Event	0.22 kft	065	QNH 1024
153650		Event	0.24 kft	068	WP 44
154550	154933	Profile 8.1	0.27 - 4.5 kft	089	Sawtooth
154933	155450	Profile 8.2	4.5 - 0.21 kft	088	Sawtooth 1kfpm
155456	163913	Run 7	0.20 - 0.16 kft	054	
155342		Event	0.23 kft	060	WP43
160736		Event	0.24 kft	028	WP 42
161341		Heimann	0.22 kft	015	Cal
162226		Event	0.20 kft	017	WP 41
163747		Event	0.18 kft	322	Abm WP40
163913	164908	Profile 9	0.16 - 10.0 kft	317	1kfpm, 240KIAS
164546		Event	6.8 kft	262	WP 87
170625		Land	0.07 kft	355	Cranfield
170719		ASP	0.07 kft	355	Closed
170959		Shutdown	0.06 kft	307	52'04.36N, 0'37.48W


Analysis chart valid 12 UTC THU 18 SEP 2008
GEOSTROPHIC WIND SCALE
IN KNOTS FOR ISOBARS AT 4 MB INTERVALS
POLAR STEREOGRAPHIC PROJECTION
N
70
60
50
40
L 974
L 978
H 1029
H 1021
H 1025
L 1016
L 1002
L 1000
L 1016
L 1014
L 1013
H 1021
H 1025
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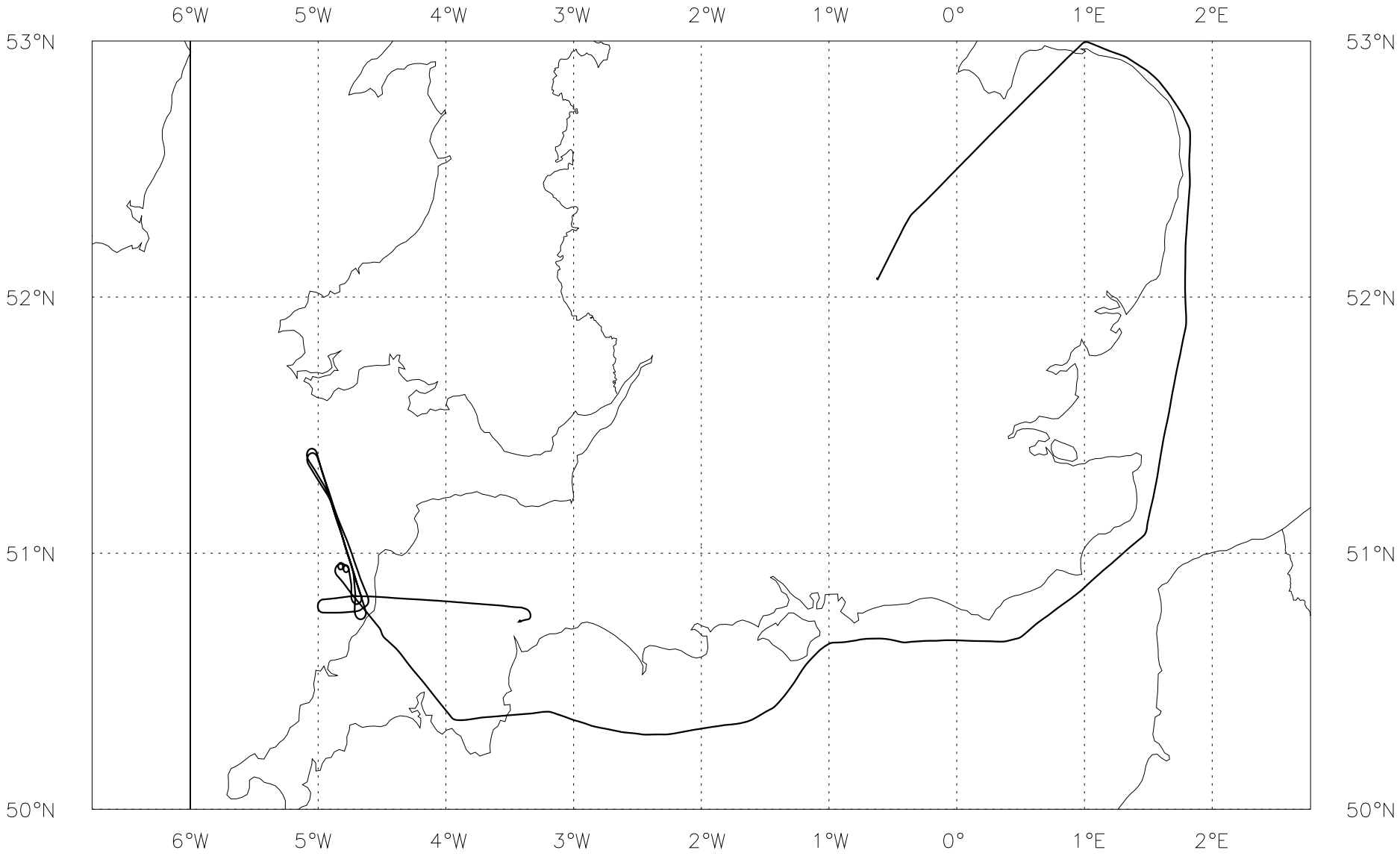
B401 Track 18-SEP-08



Pilot: Alan Roberts
NavData Cycle 2008-9 Expires: Thursday, 25 September 2008.
Scale: 1:2887333 (1 inch = 39.60 naut mi). Printed on 17 Sep 2008

54774946
FliteStar 9.4.2.0

FAAM sortie brief

ADIENT Flight B401 **Thursday 18th May, 2008**

Other comments:
This flight follows a Caviar flight from Cranfield.
Take off Exeter: 13:00 Z (14:00 L)
Land at Cranfield: 17:00 Z (18:00 L)

Operating Area:
Working over coastal areas Bristol Channel, South (Channel area), and East coasts of Britain

Sortie Objectives:
In-situ sampling of a complex mixture of fresh and aged pollution off the coasts. A mixture of the London plume and continental aerosol is expected in Bristol Channel. Radiation work in the Bristol channel.

Weather
Southeasterly flow in the south is expected to advect continental pollution from London and the continent. Clear skies desired in Bristol Channel area.

Flight patterns:

1. Given clear skies perform pirouette on the runway. (360 degree turn, at around 120 degrees per minute).

2. Take off Exeter at 14:00 local heading north towards Bristol Channel area (AMPEP point 48). [10min, T=10min]

3. Descent profile to arrive at point 48 at 50 ft. [10min, T=20min]

4. Working between points 48 and 49 perform SLRs at different levels above and below pollution layer [40min, T=60min]

5. Perform 2 orbits at low level [5min, T=65min]
6. Fast ascend to 5000 ft or appropriate altitude heading south towards waypoint 46. [25 min, T=90min]

7. Follow route around South coast of England using AMPEP points 46-> 45 -> 44 -> 43 -> 42 -> 41 -> 87 -> 80. Manoeuvres will include sawtooth profiles between 100 and 5000 ft (or top of aerosol layer), with a specific profile around Weybourne. [130min, T=220min]

8. Transit back to Cranfield. [20min, T=240min]

9. Given clear skies and enough light perform pirouette on the runway. (360 degree turn, at around 120 degrees per minute).

Mission Scientist's Debrief Sheet

ADIENT flight B401 **18th September 2008**

Weather conditions:

Frontal zone lying in the northwest approaches orientated SW to NE, cloud at all levels; frontal cirrus lying through southern Ireland to far north of England. South of this all England and Wales broken Scu and cu which is thicker in the east. Very slack pressure gradient, low winds from the east in the operating area (Bristol Channel and south coast of England). SW approaches in a pressure 'col'. "London plume" forecast to be over the Bristol Channel area and near-continental aerosol expected in the English Channel.

Summary of the flight:

A successful flight was carried out to sample the pollution aerosol plume in the Bristol Channel and along AMPEP points along the south coast as part of the ADIENT project. It is worth noting that the aerosol loadings were moderate during this flight and *lower* than they were north of the Cornish coast during flight B400 that took place several hours earlier. Note also that, except where mentioned below, all the flying below was carried out at an IAS of 210 kts (rather than 200 kts normal science speed) as time was against us for the whole flight and wanted to cover a certain distance in a fixed time period.

The transit from Exeter and profile into the operating area (start point 48) show daytime cumulus over land (tops 6000ft) but clear over the sea. This profile descent showed a strong aerosol increase at 4000ft but relatively light at very low level (500ft) i.e. the plume was somewhat elevated within the marine boundary layer: or perhaps there was a shallow, young MBL that developed below the aerosol layer (old continental BL). This latter scenario makes sense as the tephigram from the profile did not resemble a standard subsidence inversion and well-mixed boundary layer to the surface– there was plenty of structure in there. A series of SLRs was then performed between points 48 and 49 at the following levels:

(i) **500ft** (pt 48 to pt 49);
aerosol loading drops along run

(ii) **3000ft** (pt 49 to pt 48);
v. low concs at start, hit the aerosol plume along run; broken cloud above (thin Sc developed over sea at end of run)

(iii) **5000ft** (pt 48 to pt 49);
above main plume

(iv) **2000ft** (pt 49 to pt 48);
like the 3000ft run; started clean, then hit aerosol 'bank' almost like a bank of mist/fog; very distinctive to the naked eye; also broken cloud above at end of run

The northern-most edge of the aerosol plume was very marked. Unfortunately, it would seem that the strongest aerosol coincided with broken cloud. A set of 2 orbits was performed at 500ft clear of cloud, 50° angle of bank.

A profile was carried out from 500ft to 5000ft heading to the south of the Devon coast to start routing along the coast. Note the 5000ft transit (IAS 240 kts) was within aerosol over land and also penetrated some cloud (Sc). A profile descent was made into the new area and a run was started at 500ft along the coast eastward to map the aerosol conditions. Initially, pt 46 to pt 45 was not followed as originally planned, but a route closer to the coast to save time. The whole run round to Blakeney (pt 87) near Weybourne saw very little boundary layer cloud. There was a suggestion of more BC in this run from the SP2 instrument compared to the Bristol Channel. The SMPS generally showed two aerosol modes at 30 and 100 nm. Peak NOx mixing ratios reached 18-25 ppb (probably due to ship plumes in the Dover Straits but not really sure). Aerosol loadings were variable along the track but only moderate (less than $7x10^{-5}$ m^{-1} ?). One sawtooth was performed between pt 44 and pt 43, between 500ft and 4500ft (the maximum allowed in that area). The top of the profile was not quite above the aerosol, which was a shame, but I estimate that the tops must have been less than 5000ft. Evidence of a double plume in the vertical by eye. The 500ft run was resumed after the sawtooth. AMS indicated mainly sulphate by composition. PCASP steady at around 800/cc in the southeast corner of the route. A profile climb was made towards point 87 (Blakeney), with the important bit of the ascent (i.e. the lower bit that contained the aerosol) taking place east of pt 87. There was a sharp decrease in aerosol at ~2700ft and another weak layer at ~5200ft. There was a good inversion above this. The profile ended over land at FL100.

S. R. Osborne (written 22-09-08).

No SID1
No SID2
No CPC
No CCN (?)

S. R-OSBORNE.

Watch out for PCASP noise in channel 1.

levels
4000'
3000'
500'
?

Mission Scientist's Log

Flight No B401 Date 18/09/08 Page 1 of 5

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
1325 Z					
					Vx Exeter:- hazy, No Ci?
1335					Cu. 5/8 cover. Hazy sunshine.
					To EXETER.
1338		6000' → FL100			BL looks v. polluted, 'white' haze
					Cu tops. → inclins.
134426	P1	FL100	274	50°49'N 4°30'W	tr. Ci in distance (in transit)
					Start profile descent.
					tr. Ci above. Cu ends at
134640					coast → clear over sea of low cloud
		6300'			over coast?
135010		4300'			→ noting bit of structure. rise in aerosol? Humidity upon TP.
		4000'			LWC in turn during descent.
135300		1600'			TOP OF AEROSOL.
		'			Good spread in 3 DSD reg.
		1000'			LABVIEW crash upon Ne weld repl.
135426		500'			fairly well mixed layer so far.
					vis looks high. Neo' winter. DSD
					dropping on repl. (NW anticyclonic high pressure TBC)
135506	P1	50'	059		SP2 + AMS recal nothing to.
135610	P1-1	500'	332		End profile descent.
					Start SLR Prompt. 48
140150					SWS looking up.
					Neph signal dropping. PCASP 600/cc
					SP2 dropping too
					Contrails ahead. Might see them.

Mission Scientist's Log

Flight No **B** 401 Date 18/09/08

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
140430		500'			Rise in aerosol, NOx. drop in O_3??
					should be v. little sea salt. No
140610	R1/P2	500'	338	51°18'N 5°0W	white caps. End SLR, start profile ascent.
140850	P2/	3000'	142	51°12'N 5°0W	(turning in climb) End climb / start run.
		3000'			v. low cloud at start of run.
141250		3000'			can see aerosol layer ahead hitting aerosol 'bank'
141622					vis very, very poor here (cloud?)
		Peak in σ_{sp} (0.55μm) = 80 $\times 10^{-6}$ m			sun to our left and above us.
141840	R2/P3	3000'		50°42' 4°36'	Sea broken above us - buggy. End SLR, profile ascent.
142059	P3/R3	5000'	007	50°48' 4°47'	SLR above aerosol (cloud).
					Sun's mainly looking down.
142404	R3	5000'			Next dropping off - v. low now.
143046	R3/R4	5000'	338	51°15' 5°0W	End SLR, start profile descent.
143400	R4	2000'	142	51°12' 4°54'	End descent / start SLR at pollution cloud
					heading towards plume.
143800					Hit aerosol 'bank'. Under
1441					under sun again → best aerosol
					coincides with cloud!
144157	R4/P5	2000'	155	50°48' 4°36'	End SLR / start profile descent
144415		500'	357	50°48' 4°42'	End profile / start short run
					to get clear of cloud.

Mission Scientist's Log

IAS speed ≈ 210 knots throughout sortie?

Flight No **B**401 Date 18/09/08 Page 3 of 5

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
144540	01	500'		50°54'N 4°42'W	ORBITS left turn 50° bank angle
				C	below aerosol (haze falls)
					* clear of cloud *.
144657	C 01	500'			End 01.
144732	C 02	500'		C	Start orbit 2, left turn (50°)
144844	C 02	500'		50°54' 4°48'	End orbit 2.
144926	P6 ↗	500'	139	50°54' 4°48'	Start profile climb out of area.
					Heading for coast (South)
145039	P6 ↗	1950'			back into heavier pollution.
145327	P6 →	5000'	132	50°47 0°30	End profile ascent in base of
					cu/Sc. (IAS 240 kts) TRANSIT TO START
					OF "USURS" PART OF SORTIE.
145850	TRANSIT	5000'			v. hazy over land → increased large
					at this height. Count this
					as sampling!!
1503		5000'			Cloud clearing now.
150342	P7 ↓	5000'	083	50°18' 3°42'	Start profile descent into area.
					dr. on ahead
150650		2400'			Hazy appearance out ahead
					σ_{sp} (0.55μm) = 45 x10^{-6} m^{-1}.
150924		500'	090	50°18' 3°6'	Start SLR (PSAP pump back on!)
151220		500'			clear of cloud. σ_{sp} = 65 x10^{-6} m^{-1}
					Not actually using DB 66 → 45,
					Lucia staying closer to the coast in stead.
					P2 → maybe Light BC content lower
					different airmass to the Bristol Channel?

Mission Scientist's Log

ADIENT

Flight No B.401..... Date 18/09/08 Name S.R. OSBORNE age 4 of 5

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
152100		500'			MASS reporting high altitude
					moisture? Suggesting thin Ci?
					Can't see any, but aerosol v.
					hazy above. Sky not very blue
153250		500'			Isle of White to our left.
153200		500'	040	50°30'N 1°12'W	NOx ~18 pbb → ship plume?
153648		500'	071	50°36'N 0°5'W	POINT 46.
					30nm + 100 nm > SMPS mode
154120		500'			VIS incoming?
154549	RG/P8?	500↗	090	50°36' 0°6'	Start profile ascent → sawtooth
	P8.2	4500'			Can see clouds plume in the vertical
					Cond ascent/descent. Not
					quite out of cumulus → very
					close though!! (500ft max)
					Some structure in mesh.
155342	P8.4	1150'	061	50°36' 0°30'E	point 43.
155445	P8.4/RG	500'	055	50°41' 0°30'	End profile/ start run around cloud.
160000		500'			NOx ~25 pbb!! very high
					Mesh Tsp variable, SA not
					particularly high.
160640					Cu coming up over land
160735			026	51°0'24'	Point 47
					A few white caps → 553?
161030					Mesh signal v. steady at present
					AMS/SP2 steady too. Mainly
					sulphate?

Mission Scientist's Log

IAS = 210kts

Flight No **B 401** Date 18/09/08

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
~1610					
					BCASP ~800/cc steady for a while.
1620		500'	016	51°56'N 1°42'E	Nepl levels dropping gradu. now
162120					shipping near Felixstowe → plume
162225			015	51°48'N 1°42'E	point 4/ NO_x ~ 6 ppbv hits.
					↳ b/gnd ~ 4 ppbv
162640			004	52°6'N 1°42'E	aerosol bottomed out, small increase now
					(22 ± 10^{-6} m^{-1})
163228		500'			VIS decreasing again - hazy.
					Gsp increased to 50 x 10^{-6} m^{-1}.
163500					Good separation in 3 ls sth'l.
163740					A few tiny Cu to our right
163912	R7 /P9	500'	317	52°44' 1°36'	Abeam point 40 deg
					End Run & start profile climb.
					Heading tuds at 87 (Blakeney
					(rear Westbourne!)
164143	P7	2680'			V. Sharp drop in aerosol to lowest values yet.
164400		5200'			2nd layer → lower conc, but distinct.
					Contrails in distance ahead.
164532	P9→	6800'			Left turn at pt. 87,
					over (and low. SCu deck ahead.
					clear above, Tr. Ci (contrails) ahead + to right
					Good inversion.
164907	P9	F2100	233	52°48' 0°36'	End profile ascent + end sounding.

IAS 220kts

CLOUD PHYSICS LOG Flight B401

Date:17/09/08 Operator: pdr DRS time: DAU1 time: DAU2 time: DAU3 time: AUX1 time: AUX2 time: Page 1 of 1

Pcasp vref 6.9, flow 0.76, ffssp vref=3.5, 2dp end volts 1.7, 2dc end volts 1.6/1.7

G.M.T	PCASP		FFSSP	SID1	SID2	2D2-C		2D2-P		CIP25			CIP100			Habit	Remarks
	Conc/cc	Mean R	Block TX	Count	Count	Conc/L	Max size	Conc/m3	Max size	Conc m3	Max size	LWC	Conc m3	Max size	LWC		
																	Pcasp run on ground before flight with no pump to check for noise from 12:50-13:05. 2dp noise from takeoff rearmed to 1 hz pcasp noise in ch1
																	Missed one of the cip lwc probe switches after takeoff. Switched on at 13:47. Realised that I hadn't checked drive space on seadas. As 2dp has been generating a lot of noise. I quit, checked and restarted. At 13:47
13:52:00	1000																Reached top of boundary layer at 13:50:00 ~fl 45
13:50	1000																Increase in pcasp conc after gradual decrease over past 5 mins
14:09:30	150																Start of run at fl 30
14:13:30	1000																Jump from 400
14:21:00	400																Start of run 3 at fl 50
14:23:00	200																Drop from 500 to 200 in a few seconds
14:32:30	600																Rise from 200 then fall back over 20 seconds
14:38:30	1000																Back into polution. Jump from 200 counts to 1000
15:53:00	1000																Increase from 600 during sawtooth descent at ~fl10

CLOUD PHYSICS PROCESSING LOG

Flight number: **B401** **T/O:** 13:33:51
Date of flight: 18/09/08 **Land:** 17:06:25

A) FFSSP PROCESSING DONE IN EXETER		
Processing Stage	Done?	Comments
1) Transfer *.txt files from DVD to processing PC		
Bnnn_FFSSP_hh.txt for each hour of data Bnnn_FFSSP_HVMS.txt		**hh =** **Last sec processed =**
2) FTP the files (ascii) from the PC to directory PMSDATA: on FLOODS		**File size =**
3) FLOODS> **RUN MRFB:[PMS.FAST_FSSP]FSSP_EXTRACT_TAS** a) Flight number: **Bnnn** b) Path name: **MFDDATA:Bnnn_MFDX** c) Output directory: **PMSDATA:** d) Start time: *0 if unknown (see comment box)* e) End time: *240000 if unknown*		Use time just before/after take-off/landing. If T/O /landing just after/before the hour, ensure start/end time is before/after the hour if there is an FFSSP_hh.txt file for that hour.
4) FLOODS> **RUN MRFB:[PMS.FAST_FSSP]FFSSP_PROCESS_TXT** a) Flight number: **Bnnn** b) Directory: **PMSDATA:** c) TAS in processing: **Y** d) Vel threshold (clicks) **0** e) Calibration file: *Use the most recent calibration file.* Format FFSSP_CALddmmyyyy.txt Calibration files to be stored in MRFB:[PMS.FAST_FSSP] f) Adjust FFSSP time **Y/N** g) If Y, enter value to add to data time (seconds)		**Total glitches =** **Sec file written ok?** **Note calibration file used** Yes only if gross errors occur in FFSSP time eg; ~ 1hour
5) FLOODS> **WAVE** a) WAVE> **write_procffssp_to_m5,'pmsdata:Bnnn_procffssp.dat', 'mfddata:Bnnn_mfdX','pmsdata:Bnnn_m5procffssp',/auto** b) WAVE> **exit**		Use PVWAVE for this section **Note time correction applied to FFSSP by /auto =**
6) FLOODS> **MODIFY** a) Modifying datasets: **pmsdata:Bnnn_m5procffssp** b) Dataset: **mfddata:Bnnn_mfdX** c) New dataset: **mfddata:Bnnn_mfdY (y=x+1)** d) Parameter description file: *leave blank to use default*		**Input file size =** **M5 output file size =**
7) CHECKS: i). Are FFSSP and JW/Nevzorov LWC synchronized in time? *In flight_plot, parameters* *JW LWC para 535* *Nevzorov LWC para 602* *FFSSP LWC para 1202* ii). If not, repeat from step 5b replacing /auto with **addt=x** which adds x+20 secs to FFSSP time.		**Synchronized?**

CLOUD PHYSICS PROCESSING LOG

Flight number: **B401**
Date of Flight: 18/09/08

B) 2D PROCESSING		REPROCESS +1hr
Processing Stage	Done?	Comments
1) Transfer Bnnn.dat file from CD/DVD to PC	Y	
2) Zip up file on PC (Bnnn.zip)	Y	
3) FTP the zipped file (binary) from the PC to the directory SEADAS_DATA:[SEADAS_DATA] on FLOODS	Y	11213 blocks
4) Log on to FLOODS		
5) Unzip SEADAS_DATA:[SEADAS_DATA]Bnnn.zip	Y	**Size of Bnnn.dat = 117033**
6) FLOODS> **WAVE**	Y	Use PVWAVE for this section
WAVE> **CONVERT_SEADAS_FILE** a) Input file: **SEADAS_DATA:[SEADAS_DATA]Bnnn.dat** b) Output file: **SEADAS_DATA:[SEADAS_DATA]Bnnn_seadas.dat** WAVE> **exit**		**Blocks read = 28354** **Blocks written = 28354** **Bad reads = 0**
7) FLOODS> **RUN MRFB:[PMS.SEADAS]READM200_FILE**	Y	
a) Default directory: **PMSDATA:** b) Flight number: **Bnnn** c) Disk file name: **SEADAS_DATA:[SEADAS_DATA]Bnnn_seadas.dat** d) Comment string: e) Start time: *0 if unknown (T/O – 5 min)* f) End time: *240000 if unknown (Land + 5 min)* g) Read 2DC: **Y** h) Read 2DP: **Y** i) Secondary data: **Y** j) FSP-SYNC: **Y** k) cmd.str: **Y** l) Auto time correction: **N** m) Full length secondary:**N**		**Start = 133000** **End = 171000** Ignore error message scroll (vestigial error from tapes) **Are FRW, FSP, IMB, PCA,SEC files in PMSDATA? Y** **Are they non-zero in size? Y**
8) FLOODS> **WAVE**		2D image display and printing
i). WAVE> **imagedisplay** a) 2D directory name: **PMSDATA:** b) Flight number: **Bnnn** c) File generation no: **0** d) Time from IWC plot: **N** e) Select probe: (**1**) 2DC (**2**) 2DP f) Start time: *As in 7e above* g) End time: *As in 7f above* h) Time interval (sec): **5** recommended (0 for all images)		Must be done from FLOODS itself. **Note any problems with images** **2DC no images** **2DP – noise only**
ii). WAVE> **auto_image** a) 2D directory name: **PMSDATA:** b) Flight number: **Bnnn** c) Enter date: **YYYYMMDD** d) Enter start time: *0 if unknown (T/O – 1 min)* e) Enter end time: *240000 if unknown (Land – 1 min)* f) Enter time interval (sec) between successive imaged blocks: **10**		Prepare imagery for Core data From own PC again **Start =** **End =**
iii). WAVE> **exit** to create files		FAAM_YYYYMMDD_R0_ Bnnn_2Dx-images.ps
iv). FTP ascii *.PS files from PMSDATA: to PC		Notes on this in instructions
v). Load each into Ghostview or other pdf-converter		
vi). Output as pdf file (720 dpi resolution), appending name prefix of **CORE-CLOUD-PHY**_ to converted files		

9) FLOODS> **RUN MRFB:[PMS.SPEC2D.AUTO]PROCESS2D_AUTO** a) Flight number: **Bnnn** b) Directory: **PMSDATA:** c) File generation: *Hit enter* d) Time correction: *Time offset of the 2D data* e) TAS: **Y** f) MFD directory: **MFDDATA:Bnnn_tas** g) Probe number: (**1**) 2DC (**2**) 2DP (**0**) Both *0 unless either probe known to be faulty* h) Start time: *0 if unknown (T/O + 30sec)* i) End time: *240000 if unknown (Land – 30sec)* j) Nominal averaging: **0.2** seconds for conversion to M5 k) Particle type 2DC: **8** if known to be in ice cloud **11** if known to be in water cloud l) Particle type 2DP: **8** if known to be in mixed-phase **8** if unknown m) Coefficient choice: **2** n) Output root filename: **PMSDATA:Bnnn_PROC2D**	N	NB. an error message may appear, floating point exception, rerun and use time quoted in error message, repeat until successful. **X =** **Start = 133000** **End =** 171000 **Time data processed to =** **2dproc files present?** *.2dc, *.2dp and *.dat
10) FLOODS> **WAVE** i) WAVE> **WRITE_PROC2D_TO_M5, 'PMSDATA:BNNN_PROC2D.DAT', 'PMSDATA:BNNN_M5PROC2D'** ii). **exit**	N	Use PVWAVE for this section Error message about HDDR file should be ignored. **Records =**
11) FLOODS> **MODIFY** a) Modifying datasets: **pmsdata:Bnnn_m5proc2D** b) Datset: **mfddata:Bnnn_tas** c) New dataset: **mfddata:Bnnn_tas_2d** d) Parameter description file: leave blank to use default	N	 **X =** **Y = (X+1)**
12) CHECKS: Are 2DC/2DP IWC of comparable magnitude and well-correlated with Nevzorov TWC? *In flight_plot, parameters* *Nevzerov TWC para 605* *2DC IWC para 1302* *2DP IWC para 1312*	N	**Use flight_plot to check data is present in mfd file?**

CLOUD PHYSICS PROCESSING LOG

Flight number: B401
Date of Flight: 18/09/08

C) PCASP PROCESSING		
Processing Stage	Done?	Comments
1) Complete stage 7) in 2D processing Ensures Bnnn_FSP.DAT containing raw PCASP data is written to directory PMSDATA:	**Y**	
2) FLOODS> **RUN MRFB:[PMS.PCASP]PROCPCASP_NEW** a) Flight number: **Bnnn** b) File name: **PMSDATA:Bnnn_FSP.DAT** c) Root output name: **PMSDATA:Bnnn_PROCPCASP** Produces PMSDATA:Bnnn_PROCPCASP.DAT (binary) PMSDATA:Bnnn_PROCPCASP.OUT (ascii) d) Minimum size channel: *default = 1* *If smallest size channel are known to be noisy the value of the highest noise free channel to be entered here* e) Calibration volume flow rate: *Use the most recent value. (1.15ccs^{-1} Feb 07)* *Calibration files to be stored in **Exeter*** *Entering zero gives default value = 1.0 cm^{3}s^{-1}* f) Time correction: *Same value as used in 2D processing stage 9d* g) Start time: *0 if unknown* h) End time: *240000 if unknown*	**Y**	**Min size = 1** **Vol flow rate =** 0.76
3) FLOODS> **WAVE** i).WAVE> **write_procpcasp_to_m5, 'pmsdata:Bnnn_procpcasp.dat', 'pmsdata:Bnnn_m5procpcasp'** ii). WAVE> **exit**	**Y**	Use PVWAVE for this section
4) FLOODS> **MODIFY** a) Modifying datasets: **pmsdata:Bnnn_m5procpcasp** b) Dataset: **mfddata:Bnnn_tas_2d** c) New dataset: **mfddata:Bnnn_tas_2d_pcasp** d) Parameter description file: *leave blank to use default*	**Y**	**X = b401_tas** **Y = X+1 = b401_tas_pcasp**
5) CHECKS Are PCASP and JW peaks synchronous? *In flight_plot, parameters* *Neph – total blue scatter.* *PCASP conc para 1550*	**N**	**Is data present in mfd?** Use flight_plot to check.

P.S.A.P. Log

Flight No. **B**401 CAVIAR Date ..18 sept 08 Page .1. of .2.. DAT: operator

GMT	Filter Trans.	Flow Rate	B_a x 10^{-6}	Ph_det levels		Run	Remarks
Set to DRS time: done	New filter Tr = 1.000 done	Set to 3.0 lpm: N/A				Ave =30 s	←Preflight
		pump off for t/o					running psap prior to ADIENT B401 as a tester
~1341	0.871						pump on, after t/o
1452	0.808						pump off for Sc
1614	0.714						Old filter out
1615	1.000						New ilter

B401_SWS_SHIMS_EventLog.txt

```
13:16:41.05  ---      -     -     -     -
13:16:41.05  ---      -     -     -     -  +++ SOFTWARE START/RESTART +++
13:16:41.06  ---      -     -     -     -  +++ hh:mm:ss.ff / Instr / Posn / Period /
                                            tVIS/ tNIR / Comment +++
13:16:41.06  ---      -     -     -     -  +++ Flight no. B401
13:16:41.06  ---      -     -     -     -
13:17:54.32  SWS      -  1000     -     -  Sample period changed from 250ms to 1000ms.
13:17:55.65  SWS      -     -     -    10  NIR int.time changed from 10ms to 10ms.
13:17:59.71  SWS      -     -   200     -  VIS int.time changed from 10ms to 200ms.
13:17:59.71  SWS      -     -     -   200  NIR int.time changed from 10ms to 200ms.
13:18:04.28  USH      -  1000     -     -  Sample period changed from 250ms to 1000ms.
13:18:06.08  USH      -     -     -    10  NIR int.time changed from 10ms to 10ms.
13:18:09.23  USH      -     -   200     -  VIS int.time changed from 10ms to 200ms.
13:18:09.24  USH      -     -     -   200  NIR int.time changed from 10ms to 200ms.
13:18:11.63  LSH      -   100     -     -  Sample period changed from 250ms to 100ms.
13:18:13.33  LSH      -     -     -    10  NIR int.time changed from 10ms to 10ms.
13:18:16.00  LSH      -     -  1000     -  VIS int.time changed from 10ms to 1000ms.
13:18:16.01  LSH      -     -     -  1000  NIR int.time changed from 10ms to 1000ms.
13:18:22.90  SWS      -     -     -     -  Telescope motor initialised.
13:18:31.57  SWS    0.0     -     -     -  Telescope sent to 90.000
13:18:32.69  SWS   90.0     -     -     -  Telescope stopped.
13:18:43.65  SWS      -     -     -     -  Initialization: VIS OK NIR OK
13:18:47.11  USH      -     -     -     -  Initialization: VIS OK NIR OK
13:18:48.77  LSH      -     -     -     -  Initialization: VIS OK NIR OK
13:18:51.36  ---      -     -     -     -  Reset shutters.
13:19:00.61  USH      -     -     -     -  Dark measurement started.
13:19:00.62  LSH      -     -     -     -  Dark measurement started.
13:19:00.62  SWS      -     -     -     -  Dark measurement started.
13:19:02.37  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
13:19:03.86  USH      -     -     -     -  Idling
13:19:04.10  SWS      -     -     -     -  Idling
13:19:10.90  SWS      -     -     -     -  Dark measurement started.
13:19:10.90  USH      -     -     -     -  Dark measurement started.
13:19:11.59  LSH      -     -     -     -  Idling
13:19:13.34  SWS      -     -     -     -  Idling
13:19:13.53  USH      -     -     -     -  Idling
13:19:30.27  USH      -     -     -     -  Dark measurement started.
13:19:30.28  LSH      -     -     -     -  Dark measurement started.
13:19:30.28  SWS      -     -     -     -  Dark measurement started.
13:19:31.51  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
13:19:32.93  SWS      -     -     -     -  Idling
13:19:33.12  USH      -     -     -     -  Idling
13:19:40.74  LSH      -     -     -     -  Idling
13:19:41.39  LSH      -     -     -     -  Manual scene sampling started - Not Recording!
13:19:41.39  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
13:19:41.41  USH      -     -     -     -  Manual scene sampling started - Not Recording!
13:19:58.32  USH      -   100     -     -  Sample period changed from 1000ms to 100ms.
13:20:02.94  USH      -     -     -     -  Idling
13:20:03.09  USH      -     -     -     -  Manual scene sampling started - Not Recording!
13:20:04.73  USH      -     -     -     -  Manual scene recording started.
13:20:08.94  USH      -     -     -     -  Idling
13:25:05.14  USH      -     -     -     -  Manual scene recording started.
13:25:10.24  SWS      -     -     -     -  Idling
13:25:10.25  USH      -     -     -     -  Idling
13:25:10.87  LSH      -     -     -     -  Idling
13:25:11.49  SWS      -     -     -     -  Dark measurement started.
13:25:11.49  LSH      -     -     -     -  Dark measurement started.
13:25:11.51  USH      -     -     -     -  Dark measurement started.
13:25:11.92  SWS      -     -     -     -  Warning: Abnormally bright dark measurement.
13:25:12.11  USH      -     -     -     -  Warning: Abnormally bright dark measurement.
13:25:13.12  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
13:25:13.94  SWS      -     -     -     -  Idling
13:25:14.14  USH      -     -     -     -  Idling
13:25:22.35  LSH      -     -     -     -  Idling
13:25:22.96  ---      -     -     -     -  Reset shutters.
13:25:27.41  SWS      -     -     -     -  Dark measurement started.
13:25:27.42  LSH      -     -     -     -  Dark measurement started.
```

```
13:25:27.42  USH      -     -     -     -  Dark measurement started.
13:25:28.84  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
13:25:29.85  SWS      -     -     -     -  Idling
13:25:30.25  USH      -     -     -     -  Idling
13:25:32.34  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
13:25:34.15  USH      -     -     -     -  Manual scene recording started.
13:25:38.07  LSH      -     -     -     -  Idling
13:25:40.67  LSH      -     -     -     -  Manual scene recording started.
13:35:26.77  USH      -     -     -     -  Warning: Clipping may be occurring.
13:36:05.90  USH      -     -     -     -  Idling
13:36:06.00  SWS      -     -     -     -  Idling
13:36:06.54  LSH      -     -     -     -  Idling
13:36:07.30  USH      -     -     -     -  Manual scene recording started.
13:36:07.31  LSH      -     -     -     -  Manual scene recording started.
13:36:07.31  SWS      -     -     -     -  Manual scene recording started.
13:36:08.73  LSH      -     -     -     -  Idling
13:36:08.84  USH      -     -     -     -  Idling
13:36:08.92  SWS      -     -     -     -  Idling
13:36:11.16  USH      -     -     -     -  Dark measurement started.
13:36:11.16  LSH      -     -     -     -  Dark measurement started.
13:36:11.16  SWS      -     -     -     -  Dark measurement started.
13:36:11.58  USH      -     -     -     -  Warning: Abnormally bright dark measurement.
13:36:11.98  SWS      -     -     -     -  Warning: Abnormally bright dark measurement.
13:36:12.58  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
13:36:13.60  USH      -     -     -     -  Idling
13:36:14.00  SWS      -     -     -     -  Idling
13:36:17.01  ---      -     -     -     -  Reset shutters.
13:36:21.02  ---      -     -     -     -  Reset shutters.
13:36:21.82  LSH      -     -     -     -  Idling
13:36:25.31  SWS      -     -     -     -  Dark measurement started.
13:36:25.31  LSH      -     -     -     -  Dark measurement started.
13:36:25.32  USH      -     -     -     -  Dark measurement started.
13:36:26.73  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
13:36:27.74  SWS      -     -     -     -  Idling
13:36:28.14  USH      -     -     -     -  Idling
13:36:29.44  SWS      -     -     -     -  Dark measurement started.
13:36:29.45  USH      -     -     -     -  Dark measurement started.
13:36:31.89  SWS      -     -     -     -  Idling
13:36:32.09  USH      -     -     -     -  Idling
13:36:32.56  SWS      -     -     -     -  Dark measurement started.
13:36:32.56  USH      -     -     -     -  Dark measurement started.
13:36:35.00  SWS      -     -     -     -  Idling
13:36:35.20  USH      -     -     -     -  Idling
13:36:35.96  LSH      -     -     -     -  Idling
13:36:46.24  SWS   90.0     -     -     -  Telescope sent to -6.000
13:36:47.35  SWS   -6.0     -     -     -  Telescope stopped.
13:36:49.86  SWS   -6.0     -     -     -  Telescope sent to -6.000
13:36:54.74  USH      -  1000     -     -  Sample period changed from 100ms to 1000ms.
13:36:57.28  USH      -     -     -     -  Manual scene recording started.
13:36:57.28  LSH      -     -     -     -  Manual scene recording started.
13:36:57.29  SWS      -     -     -     -  Manual scene recording started.
13:41:39.41  SWS   -6.0     -     -     -  Telescope sent to -5.000
13:41:41.61  SWS   -5.0     -     -     -  Telescope sent to -5.000
13:42:43.73  USH      -     -     -     -  Idling
13:42:44.28  SWS      -     -     -     -  Idling
13:42:44.36  LSH      -     -     -     -  Idling
13:42:45.18  ---      -     -     -     -  Reset shutters.
13:42:48.91  SWS      -     -     -     -  Dark measurement started.
13:42:48.92  LSH      -     -     -     -  Dark measurement started.
13:42:48.93  USH      -     -     -     -  Dark measurement started.
13:42:50.34  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
13:42:51.35  SWS      -     -     -     -  Idling
13:42:51.75  USH      -     -     -     -  Idling
13:42:52.17  USH      -     -     -     -  Dark measurement started.
13:42:52.19  SWS      -     -     -     -  Dark measurement started.
13:42:54.61  USH      -     -     -     -  Idling
13:42:54.81  SWS      -     -     -     -  Idling
13:42:59.58  LSH      -     -     -     -  Idling
13:42:59.83  SWS   -5.0     -     -     -  Telescope sent to 174.000
```

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13:43:01.51  SWS  170.7     -      -      -  Telescope stopped.
13:43:02.93  SWS  174.0     -      -      -  Telescope sent to 174.000
13:43:06.33  SWS      -     -      -      -  Manual scene recording started.
13:43:06.33  LSH      -     -      -      -  Manual scene recording started.
13:43:06.34  USH      -     -      -      -  Manual scene recording started.
13:43:14.12  SWS      -   100      -      -  Sample period changed from 1000ms to 100ms.
13:43:17.27  SWS      -     -      -      -  Idling
13:43:20.57  SWS      -     -      -      -  Dark measurement started.
13:43:23.00  SWS      -     -      -      -  Idling
13:43:23.68  SWS      -     -      -      -  Manual scene recording started.
13:43:26.57  SWS      -     -      -      -  Warning: Clipping may be occurring.
13:43:29.25  SWS      -     -      -      -  Idling
13:43:35.71  SWS      -     -     75      -  VIS int.time changed from 200ms to 75ms.
13:43:35.72  SWS      -     -      -     75  NIR int.time changed from 200ms to 75ms.
13:43:37.81  SWS      -     -      -      -  Dark measurement started.
13:43:39.48  SWS      -     -      -      -  Idling
13:43:40.06  SWS      -     -      -      -  Dark measurement started.
13:43:41.24  SWS      -     -      -      -  Idling
13:43:41.83  SWS      -     -      -      -  Manual scene recording started.
13:43:51.39  SWS      -     -      -      -  Manual scene sampling started - Not Recording!
13:43:52.19  SWS      -     -      -      -  Idling
13:43:54.33  SWS      -     -    100      -  VIS int.time changed from 75ms to 100ms.
13:43:54.34  SWS      -     -      -    100  NIR int.time changed from 75ms to 100ms.
13:43:55.58  SWS      -     -      -      -  Dark measurement started.
13:43:57.48  SWS      -     -      -      -  Idling
13:43:57.84  SWS      -     -      -      -  Dark measurement started.
13:43:59.27  SWS      -     -      -      -  Idling
13:43:59.66  SWS      -     -      -      -  Manual scene recording started.
13:44:14.51  SWS      -     -      -      -  Warning: Clipping may be occurring.
13:44:19.10  SWS      -     -      -      -  Manual scene sampling started - Not Recording!
13:44:19.92  SWS      -     -      -      -  Idling
13:44:23.10  SWS      -     -     75      -  VIS int.time changed from 100ms to 75ms.
13:44:23.10  SWS      -     -      -     75  NIR int.time changed from 100ms to 75ms.
13:44:24.09  SWS      -     -      -      -  Dark measurement started.
13:44:25.75  SWS      -     -      -      -  Idling
13:44:26.62  SWS      -     -      -      -  Manual scene recording started.
13:44:49.96  SWS  174.0     -      -      -  Telescope sent to 176.000
13:44:51.93  SWS  176.0     -      -      -  Telescope sent to 176.000
13:45:28.38  USH      -     -      -      -  Manual scene sampling started - Not Recording!
13:45:29.31  USH      -     -      -      -  Idling
13:45:30.53  USH      -     -      -      -  Dark measurement started.
13:45:32.96  USH      -     -      -      -  Idling
13:45:35.15  USH      -     -      -      -  Manual scene recording started.
13:45:36.60  LSH      -     -      -      -  Manual scene sampling started - Not Recording!
13:45:38.32  LSH      -     -      -      -  Idling
13:45:40.11  LSH      -     -      -      -  Dark measurement started.
13:45:41.34  LSH      -     -      -      -  Warning: Abnormally bright dark measurement.
13:45:50.57  LSH      -     -      -      -  Idling
13:45:53.13  LSH      -     -      -      -  Manual scene recording started.
13:47:10.13  SWS      -     -      -      -  Manual scene sampling started - Not Recording!
13:47:10.93  SWS      -     -      -      -  Idling
13:47:14.33  SWS      -     -    200      -  VIS int.time changed from 75ms to 200ms.
13:47:14.34  SWS      -     -      -    200  NIR int.time changed from 75ms to 200ms.
13:47:15.95  SWS      -     -      -      -  Dark measurement started.
13:47:18.87  SWS      -     -      -      -  Idling
13:47:19.23  SWS      -     -      -      -  Dark measurement started.
13:47:21.67  SWS      -     -      -      -  Idling
13:47:22.00  SWS      -     -      -      -  Manual scene recording started.
13:48:09.90  USH      -     -      -      -  Manual scene sampling started - Not Recording!
13:48:10.82  USH      -     -      -      -  Idling
13:48:11.38  USH      -     -      -      -  Dark measurement started.
13:48:14.04  USH      -     -      -      -  Idling
13:48:15.71  USH      -   100      -      -  Sample period changed from 1000ms to 100ms.
13:48:17.08  USH      -     -      -      -  Dark measurement started.
13:48:19.52  USH      -     -      -      -  Idling
13:48:19.83  USH      -     -      -      -  Manual scene recording started.
13:48:40.40  ---      -     -      -      -  *** Freezer temp 10 deg C
13:50:11.66  USH      -     -      -      -  Warning: Clipping may be occurring.
13:55:16.47  SWS      -     -      -      -  Idling
```

13:55:16.47	USH	-	-	-	-	Idling
13:55:16.83	LSH	-	-	-	-	Idling
13:55:18.07	---	-	-	-	-	Reset shutters.
13:55:21.65	SWS	176.0	-	-	-	Telescope sent to -6.000
13:55:23.33	SWS	-2.0	-	-	-	Telescope stopped.
13:55:24.36	SWS	-6.0	-	-	-	Telescope sent to -6.000
13:55:27.05	SWS	-	-	-	-	Dark measurement started.
13:55:27.05	LSH	-	-	-	-	Dark measurement started.
13:55:27.06	USH	-	-	-	-	Dark measurement started.
13:55:28.49	LSH	-	-	-	-	Warning: Abnormally bright dark measurement.
13:55:29.50	SWS	-	-	-	-	Idling
13:55:29.90	USH	-	-	-	-	Idling
13:55:30.38	SWS	-	-	-	-	Dark measurement started.
13:55:30.39	USH	-	-	-	-	Dark measurement started.
13:55:32.83	SWS	-	-	-	-	Idling
13:55:33.02	USH	-	-	-	-	Idling
13:55:37.73	LSH	-	-	-	-	Idling
13:56:15.07	SWS	-	-	-	-	Manual scene recording started.
13:56:15.07	LSH	-	-	-	-	Manual scene recording started.
13:56:15.08	USH	-	-	-	-	Manual scene recording started.
13:56:15.50	SWS	-	-	-	-	Warning: Clipping may be occurring.
13:56:20.41	SWS	-	-	-	-	Manual scene sampling started - Not Recording!
13:56:21.34	SWS	-	-	-	-	Idling
13:56:25.47	SWS	-	-	75	-	VIS int.time changed from 200ms to 75ms.
13:56:25.48	SWS	-	-	-	75	NIR int.time changed from 200ms to 75ms.
13:56:26.44	SWS	-	-	-	-	Dark measurement started.
13:56:28.09	SWS	-	-	-	-	Idling
13:56:29.23	SWS	-	-	-	-	Manual scene recording started.
14:02:53.25	SWS	-	-	-	-	Dark measurement started.
14:02:54.44	SWS	-	-	-	-	Manual scene recording started.
14:02:57.95	SWS	-	-	100	-	VIS int.time changed from 75ms to 100ms.
14:02:57.96	SWS	-	-	-	100	NIR int.time changed from 75ms to 100ms.
14:03:00.46	SWS	-	-	200	-	VIS int.time changed from 100ms to 200ms.
14:03:00.46	SWS	-	-	-	200	NIR int.time changed from 100ms to 200ms.
14:03:01.73	SWS	-	-	-	-	Dark measurement started.
14:03:04.17	SWS	-	-	-	-	Manual scene recording started.
14:03:06.40	SWS	-	-	-	-	Idling
14:03:07.21	SWS	-	-	-	-	Manual scene recording started.
14:03:20.98	USH	-	-	-	-	Manual scene sampling started - Not Recording!
14:03:23.35	USH	-	-	-	-	Idling
14:03:24.07	USH	-	-	-	-	Dark measurement started.
14:03:26.51	USH	-	-	-	-	Idling
14:03:27.33	USH	-	-	-	-	Manual scene recording started.
14:03:29.72	LSH	-	-	-	-	Manual scene sampling started - Not Recording!
14:03:31.45	LSH	-	-	-	-	Idling
14:03:32.02	LSH	-	-	-	-	Dark measurement started.
14:03:33.24	LSH	-	-	-	-	Warning: Abnormally bright dark measurement.
14:03:42.49	LSH	-	-	-	-	Idling
14:03:42.87	LSH	-	-	-	-	Manual scene recording started.
14:06:14.06	SWS	-	-	-	-	Idling
14:06:14.16	USH	-	-	-	-	Idling
14:06:14.62	LSH	-	-	-	-	Idling
14:06:15.79	---	-	-	-	-	Reset shutters.
14:06:20.45	USH	-	-	-	-	Dark measurement started.
14:06:20.45	SWS	-	-	-	-	Dark measurement started.
14:06:20.46	LSH	-	-	-	-	Dark measurement started.
14:06:22.07	LSH	-	-	-	-	Warning: Abnormally bright dark measurement.
14:06:22.89	USH	-	-	-	-	Idling
14:06:23.09	SWS	-	-	-	-	Idling
14:06:31.33	LSH	-	-	-	-	Idling
14:06:31.45	LSH	-	-	-	-	Dark measurement started.
14:06:31.45	USH	-	-	-	-	Dark measurement started.
14:06:31.46	SWS	-	-	-	-	Dark measurement started.
14:06:34.08	USH	-	-	-	-	Idling
14:06:34.29	SWS	-	-	-	-	Idling
14:06:41.89	LSH	-	-	-	-	Idling
14:06:52.20	SWS	-	-	-	-	Dark measurement started.
14:06:52.21	LSH	-	-	-	-	Dark measurement started.
14:06:52.22	USH	-	-	-	-	Dark measurement started.

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14:06:53.83  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
14:06:54.64  SWS      -     -     -     -  Idling
14:06:54.84  USH      -     -     -     -  Idling
14:07:03.06  LSH      -     -     -     -  Idling
14:07:05.86  ---      -     -     -     -  *** Freezer temp 10 deg C
14:07:19.28  SWS      -     -     -     -  Dark measurement started.
14:07:19.28  LSH      -     -     -     -  Dark measurement started.
14:07:19.29  USH      -     -     -     -  Dark measurement started.
14:07:20.72  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
14:07:21.73  SWS      -     -     -     -  Idling
14:07:22.13  USH      -     -     -     -  Idling
14:07:22.86  USH      -     -     -     -  Dark measurement started.
14:07:22.88  SWS      -     -     -     -  Dark measurement started.
14:07:25.31  USH      -     -     -     -  Idling
14:07:25.50  SWS      -     -     -     -  Idling
14:07:29.95  LSH      -     -     -     -  Idling
14:07:36.05  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:07:36.05  USH      -     -     -     -  Manual scene sampling started - Not Recording!
14:07:36.07  LSH      -     -     -     -  Manual scene sampling started - Not Recording!
14:08:13.91  SWS      -     -     -     -  Idling
14:08:14.25  USH      -     -     -     -  Idling
14:08:14.72  LSH      -     -     -     -  Idling
14:08:15.80  USH      -     -     -     -  Dark measurement started.
14:08:15.80  LSH      -     -     -     -  Dark measurement started.
14:08:15.82  SWS      -     -     -     -  Dark measurement started.
14:08:17.23  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
14:08:18.24  USH      -     -     -     -  Idling
14:08:18.65  SWS      -     -     -     -  Idling
14:08:19.13  SWS      -     -     -     -  Dark measurement started.
14:08:19.13  USH      -     -     -     -  Dark measurement started.
14:08:21.60  SWS      -     -     -     -  Idling
14:08:21.80  USH      -     -     -     -  Idling
14:08:26.47  LSH      -     -     -     -  Idling
14:08:43.80  SWS      -     -     -     -  Manual scene recording started.
14:08:43.81  LSH      -     -     -     -  Manual scene recording started.
14:08:43.82  USH      -     -     -     -  Manual scene recording started.
14:09:44.52  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:09:45.46  SWS      -     -     -     -  Idling
14:09:47.54  SWS   -6.0     -     -     -  Telescope sent to 174.000
14:09:49.23  SWS  171.7     -     -     -  Telescope stopped.
14:09:50.20  SWS  174.0     -     -     -  Telescope sent to 174.000
14:09:51.14  SWS      -     -     -     -  Manual scene recording started.
14:10:52.76  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:10:53.68  SWS      -     -     -     -  Idling
14:10:54.96  SWS  174.0     -     -     -  Telescope sent to -6.000
14:10:56.67  SWS   -5.1     -     -     -  Telescope stopped.
14:10:57.54  SWS   -6.0     -     -     -  Telescope sent to -6.000
14:10:58.65  SWS      -     -     -     -  Manual scene recording started.
14:12:02.31  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:12:03.23  SWS      -     -     -     -  Idling
14:12:04.86  SWS   -6.0     -     -     -  Telescope sent to 174.000
14:12:06.51  SWS  167.2     -     -     -  Telescope stopped.
14:12:07.94  SWS  174.0     -     -     -  Telescope sent to 174.000
14:12:10.90  SWS      -     -     -     -  Manual scene recording started.
14:13:12.27  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:13:13.19  SWS      -     -     -     -  Idling
14:13:15.51  SWS  174.0     -     -     -  Telescope sent to -6.000
14:13:17.20  SWS   -4.0     -     -     -  Telescope stopped.
14:13:18.07  SWS   -6.0     -     -     -  Telescope sent to -6.000
14:13:19.15  SWS      -     -     -     -  Manual scene recording started.
14:14:20.58  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:14:22.51  SWS   -6.0     -     -     -  Telescope sent to 174.000
14:14:24.22  SWS  172.4     -     -     -  Telescope stopped.
14:14:25.18  SWS  174.0     -     -     -  Telescope sent to 174.000
14:14:48.26  SWS      -     -     -     -  Manual scene recording started.
14:14:49.57  SWS      -     -     -     -  Idling
14:14:50.23  SWS      -     -     -     -  Manual scene recording started.
14:15:32.82  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:15:33.75  SWS      -     -     -     -  Idling
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14:15:35.57  SWS  174.0     -     -     -  Telescope sent to -6.000
14:15:37.23  SWS   -1.7     -     -     -  Telescope stopped.
14:15:38.26  SWS   -6.0     -     -     -  Telescope sent to -6.000
14:15:39.33  SWS      -     -     -     -  Manual scene recording started.
14:16:41.36  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:16:42.28  SWS      -     -     -     -  Idling
14:16:44.23  SWS   -6.0     -     -     -  Telescope sent to 174.000
14:16:45.92  SWS  171.7     -     -     -  Telescope stopped.
14:16:46.96  SWS  174.0     -     -     -  Telescope sent to 174.000
14:16:48.62  SWS      -     -     -     -  Manual scene recording started.
14:17:51.03  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:17:51.95  SWS      -     -     -     -  Idling
14:17:53.18  SWS  174.0     -     -     -  Telescope sent to -6.000
14:17:54.86  SWS   -3.4     -     -     -  Telescope stopped.
14:17:55.84  SWS   -6.0     -     -     -  Telescope sent to -6.000
14:17:56.63  SWS      -     -     -     -  Manual scene recording started.
14:18:24.29  SWS      -     -     -     -  Warning: Clipping may be occurring.
14:18:35.92  SWS      -     -     -     -  Warning: Clipping may be occurring.
14:18:42.64  SWS      -     -     -     -  Idling
14:18:42.69  USH      -     -     -     -  Idling
14:18:43.50  LSH      -     -     -     -  Idling
14:18:46.49  ---      -     -     -     -  Reset shutters.
14:18:50.60  ---      -     -     -     -  Reset shutters.
14:18:57.17  SWS      -     -     -     -  Dark measurement started.
14:18:57.19  LSH      -     -     -     -  Dark measurement started.
14:18:57.19  USH      -     -     -     -  Dark measurement started.
14:18:58.81  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
14:19:00.16  USH      -     -     -     -  Idling
14:19:00.17  SWS      -     -     -     -  Idling
14:19:01.45  SWS      -     -     -     -  Dark measurement started.
14:19:01.45  USH      -     -     -     -  Dark measurement started.
14:19:03.90  SWS      -     -     -     -  Idling
14:19:04.10  USH      -     -     -     -  Idling
14:19:08.04  LSH      -     -     -     -  Idling
14:19:29.16  ---      -     -     -     -  *** Freezer temp 9 deg C
14:19:35.29  USH      -     -     -     -  Dark measurement started.
14:19:35.30  LSH      -     -     -     -  Dark measurement started.
14:19:35.32  SWS      -     -     -     -  Dark measurement started.
14:19:36.73  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
14:19:37.75  USH      -     -     -     -  Idling
14:19:38.16  SWS      -     -     -     -  Idling
14:19:38.55  USH      -     -     -     -  Dark measurement started.
14:19:38.57  SWS      -     -     -     -  Dark measurement started.
14:19:41.01  USH      -     -     -     -  Idling
14:19:41.20  SWS      -     -     -     -  Idling
14:19:44.76  USH      -     -     -     -  Manual scene sampling started - Not Recording!
14:19:44.77  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:19:45.97  LSH      -     -     -     -  Idling
14:20:22.09  SWS   -6.0     -     -     -  Telescope sent to 174.000
14:20:23.79  SWS  172.8     -     -     -  Telescope stopped.
14:20:25.78  SWS  174.0     -     -     -  Telescope sent to 174.000
14:20:55.90  USH      -     -     -     -  Idling
14:20:56.03  SWS      -     -     -     -  Idling
14:21:02.48  SWS      -     -     -     -  Manual scene recording started.
14:21:02.50  LSH      -     -     -     -  Manual scene recording started.
14:21:02.51  USH      -     -     -     -  Manual scene recording started.
14:22:15.17  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:22:16.10  SWS      -     -     -     -  Idling
14:22:17.48  SWS  174.0     -     -     -  Telescope sent to -6.000
14:22:19.18  SWS   -4.0     -     -     -  Telescope stopped.
14:22:20.05  SWS   -6.0     -     -     -  Telescope sent to -6.000
14:22:21.00  SWS      -     -     -     -  Manual scene recording started.
14:23:11.16  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:23:12.08  SWS      -     -     -     -  Idling
14:23:13.44  SWS   -6.0     -     -     -  Telescope sent to 174.000
14:23:15.14  SWS  171.6     -     -     -  Telescope stopped.
14:23:16.10  SWS  174.0     -     -     -  Telescope sent to 174.000
14:23:16.89  SWS      -     -     -     -  Manual scene recording started.
14:24:23.69  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
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14:24:24.62  SWS      -     -     -     -  Idling
14:24:25.58  SWS  174.0     -     -     -  Telescope sent to -6.000
14:24:27.25  SWS   -1.6     -     -     -  Telescope stopped.
14:24:28.29  SWS   -6.0     -     -     -  Telescope sent to -6.000
14:24:29.55  SWS      -     -     -     -  Manual scene recording started.
14:24:52.41  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:24:53.33  SWS      -     -     -     -  Idling
14:24:55.43  SWS   -6.0     -     -     -  Telescope sent to 174.000
14:24:57.15  SWS  173.6     -     -     -  Telescope stopped.
14:24:58.12  SWS  174.0     -     -     -  Telescope sent to 174.000
14:24:58.89  SWS      -     -     -     -  Manual scene recording started.
14:26:10.59  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:26:11.52  SWS      -     -     -     -  Idling
14:26:14.09  SWS  174.0     -     -     -  Telescope sent to -6.000
14:26:15.80  SWS   -4.6     -     -     -  Telescope stopped.
14:26:16.67  SWS   -6.0     -     -     -  Telescope sent to -6.000
14:26:17.32  SWS      -     -     -     -  Manual scene recording started.
14:26:33.87  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:26:34.80  SWS      -     -     -     -  Idling
14:26:37.58  SWS   -6.0     -     -     -  Telescope sent to 174.000
14:26:39.29  SWS  172.8     -     -     -  Telescope stopped.
14:26:40.16  SWS  174.0     -     -     -  Telescope sent to 174.000
14:26:41.26  SWS      -     -     -     -  Manual scene recording started.
14:27:45.34  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:27:46.28  SWS      -     -     -     -  Idling
14:27:47.42  SWS  174.0     -     -     -  Telescope sent to -6.000
14:27:49.11  SWS   -3.9     -     -     -  Telescope stopped.
14:27:49.98  SWS   -6.0     -     -     -  Telescope sent to -6.000
14:27:50.68  SWS      -     -     -     -  Manual scene recording started.
14:28:07.50  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:28:08.43  SWS      -     -     -     -  Idling
14:28:10.09  SWS   -6.0     -     -     -  Telescope sent to 174.000
14:28:11.80  SWS  172.7     -     -     -  Telescope stopped.
14:28:12.71  SWS  174.0     -     -     -  Telescope sent to 174.000
14:28:13.66  SWS      -     -     -     -  Manual scene recording started.
14:29:11.00  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:29:11.93  SWS      -     -     -     -  Idling
14:29:12.98  SWS  174.0     -     -     -  Telescope sent to -6.000
14:29:14.68  SWS   -4.0     -     -     -  Telescope stopped.
14:29:15.55  SWS   -6.0     -     -     -  Telescope sent to -6.000
14:29:15.98  SWS      -     -     -     -  Manual scene recording started.
14:29:32.73  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:29:33.65  SWS      -     -     -     -  Idling
14:29:35.56  SWS   -6.0     -     -     -  Telescope sent to 174.000
14:29:37.23  SWS  169.0     -     -     -  Telescope stopped.
14:29:38.67  SWS  174.0     -     -     -  Telescope sent to 174.000
14:29:39.75  SWS      -     -     -     -  Manual scene recording started.
14:30:47.13  USH      -     -     -     -  Idling
14:30:47.15  SWS      -     -     -     -  Idling
14:30:47.94  LSH      -     -     -     -  Idling
14:30:51.58  ---      -     -     -     -  Reset shutters.
14:30:56.12  SWS      -     -     -     -  Dark measurement started.
14:30:56.13  LSH      -     -     -     -  Dark measurement started.
14:30:56.14  USH      -     -     -     -  Dark measurement started.
14:30:57.56  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
14:30:58.60  SWS      -     -     -     -  Idling
14:30:58.97  USH      -     -     -     -  Idling
14:31:02.76  USH      -     -     -     -  Dark measurement started.
14:31:02.76  SWS      -     -     -     -  Dark measurement started.
14:31:05.23  USH      -     -     -     -  Idling
14:31:05.42  SWS      -     -     -     -  Idling
14:31:06.82  LSH      -     -     -     -  Idling
14:31:35.77  USH      -     -     -     -  Dark measurement started.
14:31:35.78  LSH      -     -     -     -  Dark measurement started.
14:31:35.78  SWS      -     -     -     -  Dark measurement started.
14:31:37.21  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
14:31:38.23  USH      -     -     -     -  Idling
14:31:38.63  SWS      -     -     -     -  Idling
14:31:46.45  LSH      -     -     -     -  Idling
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14:32:18.58  USH      -     -     -     -  Dark measurement started.
14:32:18.59  LSH      -     -     -     -  Dark measurement started.
14:32:18.61  SWS      -     -     -     -  Dark measurement started.
14:32:20.02  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
14:32:21.05  USH      -     -     -     -  Idling
14:32:21.44  SWS      -     -     -     -  Idling
14:32:21.92  USH      -     -     -     -  Dark measurement started.
14:32:21.92  SWS      -     -     -     -  Dark measurement started.
14:32:24.37  USH      -     -     -     -  Idling
14:32:24.56  SWS      -     -     -     -  Idling
14:32:29.27  LSH      -     -     -     -  Idling
14:32:32.33  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:32:32.34  LSH      -     -     -     -  Manual scene sampling started - Not Recording!
14:32:32.34  USH      -     -     -     -  Manual scene sampling started - Not Recording!
14:32:43.38  SWS      -     -     -     -  Manual scene recording started.
14:32:43.40  LSH      -     -     -     -  Manual scene recording started.
14:32:43.79  USH      -     -     -     -  Manual scene recording started.
14:33:30.72  SWS      -     -     -     -  Idling
14:33:30.81  USH      -     -     -     -  Idling
14:33:30.96  LSH      -     -     -     -  Idling
14:33:32.58  USH      -     -     -     -  Dark measurement started.
14:33:32.58  SWS      -     -     -     -  Dark measurement started.
14:33:32.60  LSH      -     -     -     -  Dark measurement started.
14:33:34.21  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
14:33:35.06  USH      -     -     -     -  Idling
14:33:35.24  SWS      -     -     -     -  Idling
14:33:35.67  USH      -     -     -     -  Dark measurement started.
14:33:35.68  SWS      -     -     -     -  Dark measurement started.
14:33:38.14  USH      -     -     -     -  Idling
14:33:38.33  SWS      -     -     -     -  Idling
14:33:43.49  LSH      -     -     -     -  Idling
14:34:03.21  USH      -     -     -     -  Manual scene recording started.
14:34:03.23  LSH      -     -     -     -  Manual scene recording started.
14:34:03.23  SWS      -     -     -     -  Manual scene recording started.
14:35:06.85  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:35:07.77  SWS      -     -     -     -  Idling
14:35:09.86  SWS  174.0     -     -     -  Telescope sent to -6.000
14:35:11.57  SWS   -4.0     -     -     -  Telescope stopped.
14:35:12.45  SWS   -6.0     -     -     -  Telescope sent to -6.000
14:35:13.69  SWS      -     -     -     -  Manual scene recording started.
14:36:11.42  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:36:12.34  SWS      -     -     -     -  Idling
14:36:14.25  SWS   -6.0     -     -     -  Telescope sent to 174.000
14:36:15.96  SWS  172.3     -     -     -  Telescope stopped.
14:36:16.84  SWS  174.0     -     -     -  Telescope sent to 174.000
14:36:17.33  SWS      -     -     -     -  Manual scene recording started.
14:37:18.67  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:37:19.60  SWS      -     -     -     -  Idling
14:37:20.82  SWS  174.0     -     -     -  Telescope sent to -6.000
14:37:22.53  SWS   -4.6     -     -     -  Telescope stopped.
14:37:23.41  SWS   -6.0     -     -     -  Telescope sent to -6.000
14:37:24.29  SWS      -     -     -     -  Manual scene recording started.
14:38:25.77  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:38:26.69  SWS      -     -     -     -  Idling
14:38:27.89  SWS   -6.0     -     -     -  Telescope sent to 174.000
14:38:29.60  SWS  172.3     -     -     -  Telescope stopped.
14:38:30.47  SWS  174.0     -     -     -  Telescope sent to 174.000
14:38:31.36  SWS      -     -     -     -  Manual scene recording started.
14:39:32.57  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:39:33.49  SWS      -     -     -     -  Idling
14:39:34.99  SWS  174.0     -     -     -  Telescope sent to -6.000
14:39:35.47  SWS  140.3     -     -     -  Telescope sent to -6.000
14:39:37.13  SWS   -6.0     -     -     -  Telescope stopped.
14:39:37.45  SWS   -6.0     -     -     -  Telescope sent to -6.000
14:39:38.35  SWS      -     -     -     -  Manual scene recording started.
14:40:39.57  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:40:40.50  SWS      -     -     -     -  Idling
14:40:41.94  SWS   -6.0     -     -     -  Telescope sent to 174.000
14:40:43.63  SWS  171.8     -     -     -  Telescope stopped.
```

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14:40:44.52  SWS  174.0     -     -     -  Telescope sent to 174.000
14:40:45.26  SWS      -     -     -     -  Manual scene recording started.
14:41:46.64  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:41:47.57  SWS      -     -     -     -  Idling
14:41:49.33  SWS  174.0     -     -     -  Telescope sent to -6.000
14:41:51.03  SWS   -4.2     -     -     -  Telescope stopped.
14:41:51.92  SWS   -6.0     -     -     -  Telescope sent to -6.000
14:41:52.57  SWS      -     -     -     -  Manual scene recording started.
14:41:52.99  SWS      -     -     -     -  Warning: Clipping may be occurring.
14:42:00.89  SWS      -     -     -     -  Idling
14:42:00.99  USH      -     -     -     -  Idling
14:42:01.13  LSH      -     -     -     -  Idling
14:42:03.01  ---      -     -     -     -  Reset shutters.
14:42:07.25  USH      -     -     -     -  Dark measurement started.
14:42:07.25  LSH      -     -     -     -  Dark measurement started.
14:42:07.29  SWS      -     -     -     -  Dark measurement started.
14:42:08.68  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
14:42:09.70  USH      -     -     -     -  Idling
14:42:10.10  SWS      -     -     -     -  Idling
14:42:11.57  USH      -     -     -     -  Dark measurement started.
14:42:11.58  SWS      -     -     -     -  Dark measurement started.
14:42:14.02  USH      -     -     -     -  Idling
14:42:14.22  SWS      -     -     -     -  Idling
14:42:17.48  SWS      -     -     -     -  Dark measurement started.
14:42:17.48  USH      -     -     -     -  Dark measurement started.
14:42:17.93  LSH      -     -     -     -  Idling
14:42:19.28  LSH      -     -     -     -  Dark measurement started.
14:42:19.94  SWS      -     -     -     -  Idling
14:42:20.15  USH      -     -     -     -  Idling
14:42:20.50  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
14:42:20.83  USH      -     -     -     -  Dark measurement started.
14:42:20.83  SWS      -     -     -     -  Dark measurement started.
14:42:23.32  USH      -     -     -     -  Idling
14:42:23.52  SWS      -     -     -     -  Idling
14:42:25.38  USH      -     -     -     -  Dark measurement started.
14:42:25.38  SWS      -     -     -     -  Dark measurement started.
14:42:27.85  USH      -     -     -     -  Idling
14:42:28.04  SWS      -     -     -     -  Idling
14:42:29.77  LSH      -     -     -     -  Idling
14:42:37.65  SWS   -6.0     -     -     -  Telescope sent to 0.000
14:42:39.32  SWS    0.0     -     -     -  Telescope sent to 0.000
14:42:43.71  SWS      -     -     -   200  NIR int.time changed from 200ms to 200ms.
14:42:45.84  SWS      -     -     -   200  NIR int.time changed from 200ms to 200ms.
14:42:50.39  SWS      -     -    30     -  VIS int.time changed from 200ms to 30ms.
14:42:50.40  SWS      -     -     -    30  NIR int.time changed from 200ms to 30ms.
14:42:59.88  SWS      -     -    35     -  VIS int.time changed from 30ms to 35ms.
14:42:59.91  SWS      -     -     -    35  NIR int.time changed from 30ms to 35ms.
14:43:02.46  SWS      -     -     -     -  Dark measurement started.
14:43:03.80  SWS      -     -     -     -  Idling
14:43:06.28  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
14:43:13.45  SWS    0.0     -     -     -  Telescope at scan limit - going to -45.0
14:43:13.93  SWS   -1.9     -     -     -  Telescope sent to -45.000
14:43:15.98  SWS      -     -     -     -  Manual scene recording started.
14:43:17.91  SWS  -45.0     -     -     -  Telescope at scan limit - going to 45.0
14:43:25.91  SWS   45.0     -     -     -  Telescope at scan limit - going to -45.0
14:43:33.89  SWS  -45.0     -     -     -  Telescope at scan limit - going to 45.0
14:43:41.91  SWS   45.0     -     -     -  Telescope at scan limit - going to -45.0
14:43:49.88  SWS  -45.0     -     -     -  Telescope at scan limit - going to 45.0
14:43:53.12  SWS  -10.4     -     -     -  Telescope stopped.
14:43:53.57  SWS  -10.4     -     -     -  Telescope sent to -45.000
14:43:56.93  SWS  -45.0     -     -     -  Telescope at scan limit - going to 45.0
14:43:57.94  SWS  -37.3     -     -     -  Telescope stopped.
14:44:02.78  SWS  -37.3     -     -     -  Telescope sent to -6.000
14:44:04.39  SWS   -6.0     -     -     -  Telescope sent to -6.000
14:44:05.66  SWS      -     -     -     -  Idling
14:44:16.69  SWS      -     -     -     -  Dark measurement started.
14:44:17.48  SWS      -     -     -     -  Idling
14:44:20.00  SWS      -     -     -     -  Manual scene recording started.
14:44:21.37  USH      -     -     -     -  Manual scene recording started.
```

14:44:21.37	LSH	-	-	-	-	Manual scene recording started.
14:45:33.38	SWS	-	-	-	-	Dark measurement started.
14:45:34.22	SWS	-	-	-	-	Manual scene recording started.
14:45:34.33	USH	-	-	-	-	Warning: Clipping may be occurring.
14:45:37.08	SWS	-	-	-	-	Idling
14:45:37.70	SWS	-	-	-	-	Manual scene recording started.
14:46:46.72	USH	-	-	-	-	Warning: Clipping may be occurring.
14:47:00.65	SWS	-	-	-	-	Manual scene sampling started - Not Recording!
14:47:01.97	SWS	-	-	-	-	Dark measurement started.
14:47:02.79	SWS	-	-	-	-	Manual scene sampling started - Not Recording!
14:47:19.18	SWS	-	-	-	-	Manual scene recording started.
14:47:27.52	USH	-	-	-	-	Warning: Clipping may be occurring.
14:48:27.27	USH	-	-	-	-	Warning: Clipping may be occurring.
14:48:47.47	SWS	-	-	-	-	Idling
14:48:47.49	USH	-	-	-	-	Idling
14:48:48.11	LSH	-	-	-	-	Idling
14:48:50.10	---	-	-	-	-	Reset shutters.
14:48:54.01	LSH	-	-	-	-	Dark measurement started.
14:48:54.01	USH	-	-	-	-	Dark measurement started.
14:48:54.03	SWS	-	-	-	-	Dark measurement started.
14:48:55.21	SWS	-	-	-	-	Idling
14:48:55.23	LSH	-	-	-	-	Warning: Abnormally bright dark measurement.
14:48:56.67	USH	-	-	-	-	Idling
14:48:57.54	USH	-	-	-	-	Dark measurement started.
14:48:57.56	SWS	-	-	-	-	Dark measurement started.
14:48:58.54	SWS	-	-	-	-	Idling
14:48:59.99	USH	-	-	-	-	Idling
14:49:00.70	SWS	-	-	-	-	Dark measurement started.
14:49:00.70	USH	-	-	-	-	Dark measurement started.
14:49:01.53	SWS	-	-	-	-	Idling
14:49:02.54	SWS	-	-	-	-	Dark measurement started.
14:49:03.33	SWS	-	-	-	-	Idling
14:49:03.40	USH	-	-	-	-	Idling
14:49:04.50	LSH	-	-	-	-	Idling
14:49:14.63	SWS	-	-	200	-	VIS int.time changed from 35ms to 200ms.
14:49:14.65	SWS	-	-	-	200	NIR int.time changed from 35ms to 200ms.
14:49:16.03	SWS	-	-	-	-	Dark measurement started.
14:49:18.96	SWS	-	-	-	-	Idling
14:49:27.20	USH	-	-	-	-	Manual scene recording started.
14:49:27.21	LSH	-	-	-	-	Manual scene recording started.
14:49:27.22	SWS	-	-	-	-	Manual scene recording started.
14:50:53.37	SWS	-6.0	-	-	-	Telescope sent to -9.000
14:50:55.38	SWS	-9.0	-	-	-	Telescope sent to -9.000
14:50:58.16	SWS	-9.0	-	-	-	Telescope sent to -9.000
14:51:48.66	USH	-	-	-	-	Idling
14:51:48.69	SWS	-	-	-	-	Idling
14:51:48.95	LSH	-	-	-	-	Idling
14:51:51.21	---	-	-	-	-	Reset shutters.
14:51:56.01	USH	-	-	-	-	Dark measurement started.
14:51:56.02	SWS	-	-	-	-	Dark measurement started.
14:51:56.03	LSH	-	-	-	-	Dark measurement started.
14:51:57.64	LSH	-	-	-	-	Warning: Abnormally bright dark measurement.
14:51:58.50	USH	-	-	-	-	Idling
14:51:58.67	SWS	-	-	-	-	Idling
14:52:03.04	USH	-	-	-	-	Dark measurement started.
14:52:03.04	SWS	-	-	-	-	Dark measurement started.
14:52:05.50	USH	-	-	-	-	Idling
14:52:05.69	SWS	-	-	-	-	Idling
14:52:06.89	LSH	-	-	-	-	Idling
14:52:14.60	USH	-	-	-	-	Manual scene recording started.
14:52:14.62	LSH	-	-	-	-	Manual scene recording started.
14:52:14.62	SWS	-	-	-	-	Manual scene recording started.
14:52:44.31	SWS	-	-	-	-	Warning: Clipping may be occurring.
14:52:47.29	SWS	-	-	-	-	Manual scene sampling started - Not Recording!
14:52:48.23	SWS	-	-	-	-	Idling
14:52:50.41	SWS	-	-	-	-	Dark measurement started.
14:52:52.86	SWS	-	-	-	-	Idling
14:52:55.02	SWS	-	-	75	-	VIS int.time changed from 200ms to 75ms.
14:52:55.03	SWS	-	-	-	75	NIR int.time changed from 200ms to 75ms.

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14:52:57.15  SWS      -     -     -     -  Dark measurement started.
14:52:58.90  SWS      -     -     -     -  Idling
14:52:59.79  SWS      -     -     -     -  Manual scene recording started.
14:53:28.73  SWS      -     -     -     -  Idling
14:53:28.77  USH      -     -     -     -  Idling
14:53:29.68  LSH      -     -     -     -  Idling
14:53:31.44  ---      -     -     -     -  Reset shutters.
14:53:34.96  SWS      -     -     -     -  Dark measurement started.
14:53:34.96  LSH      -     -     -     -  Dark measurement started.
14:53:34.97  USH      -     -     -     -  Dark measurement started.
14:53:36.19  SWS      -     -     -     -  Idling
14:53:36.40  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
14:53:37.85  USH      -     -     -     -  Idling
14:53:41.32  SWS      -     -     -     -  Dark measurement started.
14:53:41.33  USH      -     -     -     -  Dark measurement started.
14:53:42.52  SWS      -     -     -     -  Idling
14:53:43.99  USH      -     -     -     -  Idling
14:53:45.64  LSH      -     -     -     -  Idling
14:53:50.92  SWS   -9.0     -     -     -  Telescope sent to -6.000
14:53:52.93  SWS   -6.0     -     -     -  Telescope sent to -6.000
14:55:42.00  ---      -     -     -     -  *** Freezer temp 10 deg C
14:56:16.47  USH      -     -     -     -  Manual scene sampling started - Not Recording!
14:56:41.67  LSH      -     -     -     -  Manual scene sampling started - Not Recording!
14:56:41.67  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
15:02:12.34  LSH      -     -     -     -  Idling
15:02:12.35  USH      -     -     -     -  Idling
15:02:12.75  SWS      -     -     -     -  Idling
15:02:14.02  USH      -     -     -     -  Dark measurement started.
15:02:14.03  LSH      -     -     -     -  Dark measurement started.
15:02:14.04  SWS      -     -     -     -  Dark measurement started.
15:02:15.46  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
15:02:15.64  SWS      -     -     -     -  Idling
15:02:16.48  USH      -     -     -     -  Idling
15:02:17.09  SWS      -     -     -     -  Dark measurement started.
15:02:17.11  USH      -     -     -     -  Dark measurement started.
15:02:18.30  SWS      -     -     -     -  Idling
15:02:19.75  USH      -     -     -     -  Idling
15:02:19.84  SWS      -     -     -     -  Dark measurement started.
15:02:19.86  USH      -     -     -     -  Dark measurement started.
15:02:21.06  SWS      -     -     -     -  Idling
15:02:22.50  USH      -     -     -     -  Idling
15:02:22.66  SWS      -     -     -    75  NIR int.time changed from 75ms to 75ms.
15:02:23.67  SWS      -     -     -    75  NIR int.time changed from 75ms to 75ms.
15:02:24.75  LSH      -     -     -     -  Idling
15:02:25.30  SWS      -     -   200     -  VIS int.time changed from 75ms to 200ms.
15:02:25.31  SWS      -     -     -   200  NIR int.time changed from 75ms to 200ms.
15:02:26.74  LSH      -     -     -     -  Dark measurement started.
15:02:26.74  USH      -     -     -     -  Dark measurement started.
15:02:26.76  SWS      -     -     -     -  Dark measurement started.
15:02:27.97  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
15:02:29.89  USH      -     -     -     -  Idling
15:02:30.16  SWS      -     -     -     -  Idling
15:02:30.29  USH      -     -     -     -  Dark measurement started.
15:02:30.31  SWS      -     -     -     -  Dark measurement started.
15:02:32.75  USH      -     -     -     -  Idling
15:02:32.96  SWS      -     -     -     -  Idling
15:02:33.06  SWS   -6.0     -     -     -  Telescope sent to 174.000
15:02:34.77  SWS  172.7     -     -     -  Telescope stopped.
15:02:35.83  SWS  174.0     -     -     -  Telescope sent to 174.000
15:02:37.21  LSH      -     -     -     -  Idling
15:02:39.45  SWS  174.0     -     -     -  Telescope sent to -6.000
15:02:41.16  SWS   -5.1     -     -     -  Telescope stopped.
15:02:43.23  SWS   -6.0     -     -     -  Telescope sent to -6.000
15:03:30.94  USH      -     -     -     -  Manual scene sampling started - Not Recording!
15:03:30.96  LSH      -     -     -     -  Manual scene sampling started - Not Recording!
15:03:30.96  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
15:03:46.02  SWS      -     -     -     -  Manual scene recording started.
15:03:46.34  USH      -     -     -     -  Manual scene recording started.
15:03:46.59  LSH      -     -     -     -  Manual scene recording started.
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15:06:14.70  SWS   -6.0     -     -     -  Telescope sent to -4.000
15:06:16.17  SWS   -4.0     -     -     -  Telescope sent to -4.000
15:08:56.40  USH      -     -     -     -  Idling
15:08:56.53  SWS      -     -     -     -  Idling
15:08:56.65  LSH      -     -     -     -  Idling
15:08:58.04  USH      -     -     -     -  Dark measurement started.
15:08:58.06  LSH      -     -     -     -  Dark measurement started.
15:08:58.06  SWS      -     -     -     -  Dark measurement started.
15:08:59.29  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
15:09:00.74  SWS      -     -     -     -  Idling
15:09:00.91  USH      -     -     -     -  Idling
15:09:01.52  USH      -     -     -     -  Dark measurement started.
15:09:01.53  SWS      -     -     -     -  Dark measurement started.
15:09:03.99  USH      -     -     -     -  Idling
15:09:04.19  SWS      -     -     -     -  Idling
15:09:04.64  USH      -     -     -     -  Dark measurement started.
15:09:04.66  SWS      -     -     -     -  Dark measurement started.
15:09:07.08  USH      -     -     -     -  Idling
15:09:07.29  SWS      -     -     -     -  Idling
15:09:08.54  LSH      -     -     -     -  Idling
15:09:27.66  SWS      -     -     -     -  Manual scene recording started.
15:09:27.67  LSH      -     -     -     -  Manual scene recording started.
15:09:27.68  USH      -     -     -     -  Manual scene recording started.
15:10:06.70  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
15:10:08.30  SWS   -4.0     -     -     -  Telescope sent to -6.000
15:10:09.74  SWS   -6.0     -     -     -  Telescope sent to -6.000
15:10:11.23  SWS      -     -     -     -  Manual scene recording started.
15:10:34.83  ---      -     -     -     -  *** Freezer temp 10 deg C
15:11:16.23  SWS      -     -     -     -  Manual scene sampling started - Not Recording!
15:11:17.17  SWS      -     -     -     -  Idling
15:11:19.05  SWS   -6.0     -     -     -  Telescope sent to -5.000
15:11:19.47  SWS   -5.0     -     -     -  Telescope sent to -5.000
15:11:20.37  SWS   -5.0     -     -     -  Telescope stopped.
15:11:21.84  SWS      -     -     -     -  Manual scene recording started.
15:13:40.01  SWS   -5.0     -     -     -  Telescope sent to -6.000
15:13:45.58  SWS   -6.0     -     -     -  Telescope sent to -6.000
15:19:32.22  USH      -     -     -     -  Idling
15:19:32.25  SWS      -     -     -     -  Idling
15:19:32.81  LSH      -     -     -     -  Idling
15:19:33.67  ---      -     -     -     -  Reset shutters.
15:19:37.31  USH      -     -     -     -  Dark measurement started.
15:19:37.32  SWS      -     -     -     -  Dark measurement started.
15:19:37.33  LSH      -     -     -     -  Dark measurement started.
15:19:38.95  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
15:19:39.78  USH      -     -     -     -  Idling
15:19:40.03  SWS      -     -     -     -  Idling
15:19:40.38  USH      -     -     -     -  Dark measurement started.
15:19:40.39  SWS      -     -     -     -  Dark measurement started.
15:19:42.85  SWS      -     -     -     -  Idling
15:19:43.03  USH      -     -     -     -  Idling
15:19:43.43  USH      -     -     -     -  Dark measurement started.
15:19:43.43  SWS      -     -     -     -  Dark measurement started.
15:19:45.90  USH      -     -     -     -  Idling
15:19:46.09  SWS      -     -     -     -  Idling
15:19:48.22  LSH      -     -     -     -  Idling
15:19:48.93  LSH      -     -     -     -  Manual scene recording started.
15:19:48.93  SWS      -     -     -     -  Manual scene recording started.
15:19:48.95  USH      -     -     -     -  Manual scene recording started.
15:29:51.60  USH      -     -     -     -  Idling
15:29:51.63  SWS      -     -     -     -  Idling
15:29:51.85  LSH      -     -     -     -  Idling
15:29:55.28  ---      -     -     -     -  Reset shutters.
15:30:00.56  USH      -     -     -     -  Dark measurement started.
15:30:00.57  LSH      -     -     -     -  Dark measurement started.
15:30:00.57  SWS      -     -     -     -  Dark measurement started.
15:30:02.00  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
15:30:03.04  USH      -     -     -     -  Idling
15:30:03.16  USH      -     -     -     -  Dark measurement started.
15:30:03.47  SWS      -     -     -     -  Idling
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15:30:05.68  USH      -     -     -     -  Idling
15:30:07.30  USH      -     -     -     -  Dark measurement started.
15:30:07.30  SWS      -     -     -     -  Dark measurement started.
15:30:09.77  USH      -     -     -     -  Idling
15:30:09.97  SWS      -     -     -     -  Idling
15:30:10.42  USH      -     -     -     -  Dark measurement started.
15:30:10.42  SWS      -     -     -     -  Dark measurement started.
15:30:11.24  LSH      -     -     -     -  Idling
15:30:12.88  USH      -     -     -     -  Idling
15:30:13.08  SWS      -     -     -     -  Idling
15:30:15.03  USH      -     -     -     -  Manual scene recording started.
15:30:15.05  SWS      -     -     -     -  Manual scene recording started.
15:30:15.06  LSH      -     -     -     -  Manual scene recording started.
15:38:00.79  SWS      -     -     -     -  Warning: Clipping may be occurring.
15:38:10.57  SWS      -     -     -     -  Warning: Clipping may be occurring.
15:38:36.32  SWS      -     -     -     -  Warning: Clipping may be occurring.
15:38:46.93  SWS      -     -     -     -  Warning: Clipping may be occurring.
15:39:02.42  SWS      -     -     -     -  Warning: Clipping may be occurring.
15:39:12.79  SWS      -     -     -     -  Warning: Clipping may be occurring.
15:39:19.56  SWS      -     -     -     -  Warning: Clipping may be occurring.
15:39:35.09  SWS      -     -     -     -  Warning: Clipping may be occurring.
15:39:41.42  SWS      -     -     -     -  Warning: Clipping may be occurring.
15:39:48.86  SWS      -     -     -     -  Warning: Clipping may be occurring.
15:39:56.11  SWS      -     -     -     -  Warning: Clipping may be occurring.
15:40:13.15  SWS      -     -     -     -  Warning: Clipping may be occurring.
15:40:17.69  LSH      -     -     -     -  Idling
15:40:17.74  USH      -     -     -     -  Idling
15:40:17.89  SWS      -     -     -     -  Idling
15:40:19.12  ---      -     -     -     -  Reset shutters.
15:40:23.24  SWS      -     -     -     -  Dark measurement started.
15:40:23.24  LSH      -     -     -     -  Dark measurement started.
15:40:23.25  USH      -     -     -     -  Dark measurement started.
15:40:24.67  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
15:40:25.73  SWS      -     -     -     -  Idling
15:40:25.86  SWS      -     -     -     -  Dark measurement started.
15:40:26.18  USH      -     -     -     -  Idling
15:40:27.87  USH      -     -     -     -  Dark measurement started.
15:40:28.34  SWS      -     -     -     -  Idling
15:40:28.83  SWS      -     -     -     -  Dark measurement started.
15:40:30.36  USH      -     -     -     -  Idling
15:40:31.29  SWS      -     -     -     -  Idling
15:40:31.63  USH      -     -     -     -  Dark measurement started.
15:40:31.65  SWS      -     -     -     -  Dark measurement started.
15:40:33.93  LSH      -     -     -     -  Idling
15:40:34.12  USH      -     -     -     -  Idling
15:40:34.34  SWS      -     -     -     -  Idling
15:40:35.20  USH      -     -     -     -  Manual scene recording started.
15:40:35.22  SWS      -     -     -     -  Manual scene recording started.
15:40:35.23  LSH      -     -     -     -  Manual scene recording started.
15:45:41.81  USH      -     -     -     -  Idling
15:45:41.83  SWS      -     -     -     -  Idling
15:45:41.86  USH      -     -     -     -  Idling
15:45:41.86  SWS      -     -     -     -  Idling
15:45:42.62  LSH      -     -     -     -  Idling
15:45:47.16  LSH      -     -     -     -  Dark measurement started.
15:45:47.16  SWS      -     -     -     -  Dark measurement started.
15:45:47.20  USH      -     -     -     -  Dark measurement started.
15:45:48.40  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
15:45:49.83  SWS      -     -     -     -  Idling
15:45:50.03  USH      -     -     -     -  Idling
15:45:57.67  LSH      -     -     -     -  Idling
15:46:07.66  SWS   -6.0     -     -     -  Telescope sent to -8.000
15:46:10.47  USH      -     -     -     -  Manual scene recording started.
15:46:10.47  LSH      -     -     -     -  Manual scene recording started.
15:46:10.48  SWS      -     -     -     -  Manual scene recording started.
15:47:55.02  SWS   -8.0     -     -     -  Telescope sent to -9.000
15:47:56.18  SWS   -9.0     -     -     -  Telescope sent to -9.000
15:49:36.94  LSH      -     -     -     -  Idling
15:49:37.04  SWS      -     -     -     -  Idling
```

15:49:37.06	USH	-	-	-	-	Idling
15:49:40.01	SWS	-	-	-	-	Dark measurement started.
15:49:40.01	LSH	-	-	-	-	Dark measurement started.
15:49:40.03	USH	-	-	-	-	Dark measurement started.
15:49:41.44	LSH	-	-	-	-	Warning: Abnormally bright dark measurement.
15:49:42.49	SWS	-	-	-	-	Idling
15:49:42.87	USH	-	-	-	-	Idling
15:49:50.80	LSH	-	-	-	-	Idling
15:49:51.92	SWS	-9.0	-	-	-	Telescope sent to -5.000
15:49:53.39	SWS	-5.0	-	-	-	Telescope sent to -5.000
15:49:54.52	USH	-	-	-	-	Manual scene recording started.
15:49:54.52	LSH	-	-	-	-	Manual scene recording started.
15:49:54.53	SWS	-	-	-	-	Manual scene recording started.
15:50:20.32	SWS	-5.0	-	-	-	Telescope sent to -4.000
15:50:21.81	SWS	-4.0	-	-	-	Telescope sent to -4.000
15:51:47.05	---	-	-	-	-	*** Freezer temp 9 deg C
15:54:47.39	USH	-	-	-	-	Idling
15:54:47.43	SWS	-	-	-	-	Idling
15:54:47.46	LSH	-	-	-	-	Idling
15:54:48.78	USH	-	-	-	-	Dark measurement started.
15:54:48.79	SWS	-	-	-	-	Dark measurement started.
15:54:48.82	LSH	-	-	-	-	Dark measurement started.
15:54:50.41	LSH	-	-	-	-	Warning: Abnormally bright dark measurement.
15:54:51.30	USH	-	-	-	-	Idling
15:54:51.55	SWS	-	-	-	-	Idling
15:54:51.76	USH	-	-	-	-	Dark measurement started.
15:54:51.76	SWS	-	-	-	-	Dark measurement started.
15:54:54.24	USH	-	-	-	-	Idling
15:54:54.41	SWS	-	-	-	-	Idling
15:54:54.78	SWS	-	-	-	-	Dark measurement started.
15:54:54.80	USH	-	-	-	-	Dark measurement started.
15:54:57.26	SWS	-	-	-	-	Idling
15:54:57.45	USH	-	-	-	-	Idling
15:54:59.64	LSH	-	-	-	-	Idling
15:55:00.66	SWS	-	-	-	-	Manual scene recording started.
15:55:00.66	LSH	-	-	-	-	Manual scene recording started.
15:55:00.68	USH	-	-	-	-	Manual scene recording started.
15:59:42.69	SWS	-4.0	-	-	-	Telescope sent to -5.000
15:59:44.17	SWS	-5.0	-	-	-	Telescope sent to -5.000
16:05:07.32	USH	-	-	-	-	Idling
16:05:07.43	SWS	-	-	-	-	Idling
16:05:07.82	LSH	-	-	-	-	Idling
16:05:09.47	---	-	-	-	-	Reset shutters.
16:05:13.13	USH	-	-	-	-	Dark measurement started.
16:05:13.14	LSH	-	-	-	-	Dark measurement started.
16:05:13.15	SWS	-	-	-	-	Dark measurement started.
16:05:14.37	LSH	-	-	-	-	Warning: Abnormally bright dark measurement.
16:05:15.82	USH	-	-	-	-	Idling
16:05:16.01	SWS	-	-	-	-	Idling
16:05:16.38	USH	-	-	-	-	Dark measurement started.
16:05:16.39	SWS	-	-	-	-	Dark measurement started.
16:05:18.86	USH	-	-	-	-	Idling
16:05:19.05	SWS	-	-	-	-	Idling
16:05:19.41	SWS	-	-	-	-	Dark measurement started.
16:05:19.44	USH	-	-	-	-	Dark measurement started.
16:05:21.87	SWS	-	-	-	-	Idling
16:05:22.07	USH	-	-	-	-	Idling
16:05:23.63	LSH	-	-	-	-	Idling
16:05:24.05	SWS	-	-	-	-	Manual scene recording started.
16:05:24.06	LSH	-	-	-	-	Manual scene recording started.
16:05:24.07	USH	-	-	-	-	Manual scene recording started.
16:17:29.16	USH	-	-	-	-	Idling
16:17:29.18	SWS	-	-	-	-	Idling
16:17:29.37	LSH	-	-	-	-	Idling
16:17:31.54	---	-	-	-	-	Reset shutters.
16:17:35.18	USH	-	-	-	-	Dark measurement started.
16:17:35.18	LSH	-	-	-	-	Dark measurement started.
16:17:35.19	SWS	-	-	-	-	Dark measurement started.
16:17:36.61	LSH	-	-	-	-	Warning: Abnormally bright dark measurement.

```
16:17:37.63  USH      -     -     -     -  Idling
16:17:38.03  SWS      -     -     -     -  Idling
16:17:38.36  USH      -     -     -     -  Dark measurement started.
16:17:38.37  SWS      -     -     -     -  Dark measurement started.
16:17:40.85  USH      -     -     -     -  Idling
16:17:41.06  SWS      -     -     -     -  Idling
16:17:41.44  USH      -     -     -     -  Dark measurement started.
16:17:41.44  SWS      -     -     -     -  Dark measurement started.
16:17:43.90  USH      -     -     -     -  Idling
16:17:44.11  SWS      -     -     -     -  Idling
16:17:44.43  SWS      -     -     -     -  Dark measurement started.
16:17:44.45  USH      -     -     -     -  Dark measurement started.
16:17:45.88  LSH      -     -     -     -  Idling
16:17:46.89  SWS      -     -     -     -  Idling
16:17:47.08  USH      -     -     -     -  Idling
16:17:47.41  LSH      -     -     -     -  Manual scene recording started.
16:17:47.41  USH      -     -     -     -  Manual scene recording started.
16:17:47.42  SWS      -     -     -     -  Manual scene recording started.
16:18:31.78  ---      -     -     -     -  *** Freezer temp 10 deg C
16:27:50.55  LSH      -     -     -     -  Idling
16:27:50.58  USH      -     -     -     -  Idling
16:27:50.67  SWS      -     -     -     -  Idling
16:27:52.29  ---      -     -     -     -  Reset shutters.
16:27:56.46  SWS      -     -     -     -  Dark measurement started.
16:27:56.48  LSH      -     -     -     -  Dark measurement started.
16:27:56.48  USH      -     -     -     -  Dark measurement started.
16:27:57.72  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
16:27:59.15  USH      -     -     -     -  Idling
16:27:59.35  SWS      -     -     -     -  Idling
16:27:59.89  USH      -     -     -     -  Dark measurement started.
16:27:59.92  SWS      -     -     -     -  Dark measurement started.
16:28:02.34  USH      -     -     -     -  Idling
16:28:02.54  SWS      -     -     -     -  Idling
16:28:02.82  USH      -     -     -     -  Dark measurement started.
16:28:02.83  SWS      -     -     -     -  Dark measurement started.
16:28:05.30  USH      -     -     -     -  Idling
16:28:05.51  SWS      -     -     -     -  Idling
16:28:05.99  SWS      -     -     -     -  Dark measurement started.
16:28:05.99  USH      -     -     -     -  Dark measurement started.
16:28:07.01  LSH      -     -     -     -  Idling
16:28:08.46  SWS      -     -     -     -  Idling
16:28:08.66  USH      -     -     -     -  Idling
16:28:08.97  USH      -     -     -     -  Manual scene recording started.
16:28:08.99  SWS      -     -     -     -  Manual scene recording started.
16:28:09.01  LSH      -     -     -     -  Manual scene recording started.
16:38:11.40  SWS      -     -     -     -  Idling
16:38:11.46  USH      -     -     -     -  Idling
16:38:11.47  USH      -     -     -     -  Idling
16:38:12.14  LSH      -     -     -     -  Idling
16:38:15.07  ---      -     -     -     -  Reset shutters.
16:38:18.69  LSH      -     -     -     -  Dark measurement started.
16:38:18.70  USH      -     -     -     -  Dark measurement started.
16:38:18.71  SWS      -     -     -     -  Dark measurement started.
16:38:19.93  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
16:38:21.35  USH      -     -     -     -  Idling
16:38:21.55  SWS      -     -     -     -  Idling
16:38:21.97  USH      -     -     -     -  Dark measurement started.
16:38:21.98  SWS      -     -     -     -  Dark measurement started.
16:38:24.47  USH      -     -     -     -  Idling
16:38:24.65  SWS      -     -     -     -  Idling
16:38:25.81  USH      -     -     -     -  Dark measurement started.
16:38:25.82  SWS      -     -     -     -  Dark measurement started.
16:38:28.29  USH      -     -     -     -  Idling
16:38:28.48  SWS      -     -     -     -  Idling
16:38:29.23  LSH      -     -     -     -  Idling
16:38:29.66  USH      -     -     -     -  Dark measurement started.
16:38:29.68  SWS      -     -     -     -  Dark measurement started.
16:38:29.69  LSH      -     -     -     -  Dark measurement started.
16:38:31.31  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
```

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16:38:32.13  USH      -     -     -     -  Idling
16:38:32.33  SWS      -     -     -     -  Idling
16:38:38.49  USH      -     -     -     -  Manual scene recording started.
16:38:38.50  SWS      -     -     -     -  Manual scene recording started.
16:38:40.64  LSH      -     -     -     -  Idling
16:38:47.23  LSH      -     -     -     -  Manual scene recording started.
16:39:16.10  USH      -     -     -     -  Idling
16:39:16.13  LSH      -     -     -     -  Idling
16:39:16.26  SWS      -     -     -     -  Idling
16:39:21.68  USH      -     -     -     -  Manual scene sampling started - Not Recording!
16:39:22.63  USH      -     -     -     -  Idling
16:39:24.56  USH      -     -     -     -  Dark measurement started.
16:39:24.56  SWS      -     -     -     -  Dark measurement started.
16:39:24.57  LSH      -     -     -     -  Dark measurement started.
16:39:26.21  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
16:39:27.03  USH      -     -     -     -  Idling
16:39:27.22  SWS      -     -     -     -  Idling
16:39:29.87  USH      -     -     -     -  Manual scene recording started.
16:39:29.88  SWS      -     -     -     -  Manual scene recording started.
16:39:35.47  LSH      -     -     -     -  Idling
16:39:36.04  LSH      -     -     -     -  Manual scene recording started.
16:39:56.59  SWS   -5.0     -     -     -  Telescope sent to -10.000
16:39:58.87  SWS  -10.0     -     -     -  Telescope sent to -10.000
16:40:11.76  SWS  -10.0     -     -     -  Telescope sent to -8.000
16:40:12.76  SWS   -8.0     -     -     -  Telescope sent to -8.000
16:43:08.31  ---      -     -     -     -  *** Freezer temp 8 deg C
16:49:11.03  USH      -     -     -     -  Idling
16:49:11.07  SWS      -     -     -     -  Idling
16:49:11.48  LSH      -     -     -     -  Idling
16:49:13.24  ---      -     -     -     -  Reset shutters.
16:49:18.15  LSH      -     -     -     -  Dark measurement started.
16:49:18.15  SWS      -     -     -     -  Dark measurement started.
16:49:18.19  USH      -     -     -     -  Dark measurement started.
16:49:19.39  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
16:49:20.82  SWS      -     -     -     -  Idling
16:49:21.03  USH      -     -     -     -  Idling
16:49:21.47  USH      -     -     -     -  Dark measurement started.
16:49:21.50  SWS      -     -     -     -  Dark measurement started.
16:49:23.93  USH      -     -     -     -  Idling
16:49:24.13  SWS      -     -     -     -  Idling
16:49:24.38  USH      -     -     -     -  Dark measurement started.
16:49:24.39  SWS      -     -     -     -  Dark measurement started.
16:49:26.85  USH      -     -     -     -  Idling
16:49:27.06  SWS      -     -     -     -  Idling
16:49:28.65  LSH      -     -     -     -  Idling
16:49:32.01  ---      -     -     -     -  *** endex
```

Wet Nephelometer Log

Flight No B404 Date 18/04/2008 Operator's name: D. TIDDEMAN Page 1 of 2

GMT	Run	Height	Sample flow	Dry neph RH	Wet neph RH	Temp ramp	T_{water}	Remarks
~134241	transit	FL100	10.9	18.2	32.4	—	18°	Chiller ON
134404	Profile1	↘	11.7	13.5	32.4	↗40	16°	
1354								Lab View died - Restarted
135630	Run1	500ft	15.2	48.7	78.8	↗40	39°	
135800	"	"	15.3	49.4	80.0	↘5°	39°	
140406	"	"	15.3	47.8	53.7	↗40°	15°	
140840	Run2	3000ft	14.1	32.7	79.1	↘15°	39°	
141209	"	"	14.0	31.1	54.1	↗40°	23°	
141535	"	"	14.1	40.9	79.8	↗45°	38°	
141830	"	"	13.9	38.0	90.6	↘40°	45°	
143410	Run3	2000ft	14.5	26.0	81.2	↘15	40°	
144005	"	"	14.5	44.3	57.2	↗40°	18°	
145030	Profile		14.4	45.5	85.2	↘15°	40°	
1507								Wet Died again!
150450	Run6	500ft	15.3	50.0	44.4	↗40°	12°	
151606	"	"	15.2	46.1	82.9	↗45°	40°	
151750	"	"	15.2	46.1	89.7	↘15°	45°	
1524	—	—				—		Died not restarted again
153060	"	"	15.2	46.5	83.5	↘10°	40°	
153930	"	"	15.2	46.5	50.0	↗40°	11°	

Wet Nephelometer Log

Flight No **B**.401..... Date 19/9/2008 Operator's name: D. Tiddeman..... Page 2 of 2

GMT	Run	Height	Sample flow	Dry neph RH	Wet neph RH	Temp ramp	T_{water}	Remarks
154450	Run6	500M	15.1	~~42~~ 42.3	81.9	↗45°	38°	
154550	Prof181	Sawtooth	15.0	34.3	89.7	↘40°		
155728	Run7	500M	15.2	38.3	85.2	↘10°	40°	
160622	"	"	15.2	37.0	50.0	↗40°	12°	
161910	"	"	12.9	~~38~~ 38.3	87	↘10°	40°	
162400	"	"	12.8	39.3	63.1	↗40°	20°	
163129	"	"	12.9	41.6	88.5	↘35°	40°	
164920								Chiller off End of Science

Microwave Radiometers FLIGHT LOG	Date	18/08/08	Flight	B401	log pages	3
Operator(s)	Pollard		Campaign	CAVIAR		
Departure	Exeter		Arrival	Cranfield		

System start

MARSS

Visual pod inspection	Start-up done on B400					X
Close 3 SSP circuit breakers						X
Close all MARSS circuit breakers						X
FERA on				at time	05:30	
Temperature controller initial temps	Ch16	16.8°C	Ch 17	16.9°C	Ch18	16.2°C
Temperature controller set points		54°C		58°C	-20	40°C
MARSS CPU on				at time	05:33	
Initial target temperatures	Hot	288.4		Cold	285.4	
Target heating						X
*** CHECK SCAN HEAD CLEAR ***						X
Scanning on (LMD box)				at time	05:37	
Scan indication		Monitor	›		Visual	X

Deimos

Deimos Orientation (Nadir or Zenith)						Z
Close all Deimos circuit breakers						X
Turn on Deimos CPU						X
*** CHECK SCAN HEAD CLEAR ***						X
Start Deimos Software				at time	10:40	
Initial target temperatures	Hot	287.5		Cold	286.4	
Target heating						X
Scan indication		Monitor	›		Visual	X
Weather	Cloud			Precip		
	Surface			Pressure		
	Other					

System functionality check

(after initial system warmup, approx 1 hour)

PC to DRS Time error	$t_{PC}=t_{DRS}$ +	0		at time	07:19	
Brightness temps 'sensible'						X
Target temps MARSS:	Hot	344.6		Cold	284.6	
Target temps Deimos:	Hot	344.9		Cold	297.0	

Channel gains 'sensible'	Ch1 A (-)	Ch3 A (-)	Ch1 B (-)	Ch3 B (-)	
	54.4	14.9	54.7	13.2	
	Ch16 (40-44)	Ch17 (45-49)	Ch18 (40-44)	Ch19 (40-44)	Ch20 (44-48)
	39.17	32.81	40.29	41.43	43.03

Power changeover

Headset on before start		
Listen to engine start sequence	4, 3, 2, 1.	
LMD off (3 switches, bottom to top)		
Exit Deimos Software (x)		
POWER CHANGEOVER		
LMD on (3 switches, top to bottom)	then pushbutton	
Restart Deimos Software		
System running again		at time

Flight #	B401	Date	18/08/08	Operator(s)	Pollard	log page	2	of	3

Time	**Run id**	**Alt/FL**	*Remarks*	**Sys**
12:25			Scanner off during refuel	
13:57			Trace of Ci above	
			Since early in sortie, 24 GHz has been giving values that would be sensible if positive	
16:40			MaD off	

Flight #	B401	Date	18/08/08	Operator(s)	Pollard	log page	3	of	3

Time	**Run id**	**Alt/FL**	*Remarks*	**Sys**

Data Processing Log		Initials	Date
Flight data copied from MARSS/Deimos PC flash disk to Martian C:\Bxxx\			
Check disc space on flash disk (need >~10 MB free)			
Copy* Martian logged data from to C:\Bxxx\			
Wave processing run and BT files generated			
DQM file generated and uploaded			
NetCDF file generated and uploaded			
C:\Bxxx\ copied to USB drive or CD			
Data processing issues/notes:			

Flight: B401

KEY

- Not Fitted
- Fitted, Not Operated
- Duff Data
- Minor Problems
- OK

Thermometers
- Cabin Temperature:
- Heimann:
- Deiced Temp:
- Non-deiced Temp:

Hygrometers
- FWVS:
- Buck CR2:
- General Eastern:
- Johnson Williams:
- Nevzorov:
- Total Water Probe:

Cameras
- Downward Facing:
- Forward Facing:
- Rearward Facing:
- Upward Facing:

Navigation + Aircraft
- Cruciform GPS:
- GIN Applanix:
- INU Honeywell:
- Radar Altimeter:
- RVSM IAS:
- RVSM Static Pressure:
- XR5 GPS:

Misc Core
- AMTG:
- AVAPS:
- Cabin Pressure:
- Fax machine:
- Printer:
- S9 Static Pressure:
- Satcom C:
- Satcom H:
- Turb Centre-Static:
- Turb Left Right:
- Turb Up-Down:
- Turb Horizontal Chk:
- Turb Vertical Chk:
- Weather Radar:

DLUs:
- DLU AERACK:
- DLU BBR Lower:
- DLU BBR Upper:
- DLU Core Chem:
- DLU Core Consoles:
- DLU Port Aft:
- DLU Port Fwd:
- DLU Stbd Fwd:

Radiometers
Lower:
- BBR (clear) Lower:
- BBR (IR) Lower:
- BBR (red) Lower:

Upper:
- BBR (clear) Upper:
- BBR (IR) Upper:
- BBR (red) Upper:

- ARIES:
- DEIMOS:
- IR Camera:
- JNO2 Lower:
- JNO2 Upper:
- JO1D Lower:
- JO1D Upper:
- MARSS:
- SHIMS Lower:
- SHIMS Upper:
- SWS:
- TAFTS:

Cloud Probes
- 2DC:
- 2DP:
- FFSSP:
- PCASP:
- 2DS:
- ADA:
- CAPS:
- CCN:
- CDP (fuselage):
- CDP (Canister):
- CIP 100:
- CIP 25:
- CPI:
- CVI:
- SID1:
- SID2:

Aerosol
- CPC 3025A:
- CPC 3786 H2O:
- Filters 47mm:
- Filters 90mm:
- Neph - Dry:
- Neph - Wet:
- PSAP:
- AMS:
- CPC 3025 (AMS):
- INC:
- VACC:
- CPC 3010A (CVI):
- SP2:
- UHSAS:

Chemistry
- CO Aerolaser 5002:
- NOx TE42C:
- Ozone TE49C:
- Ozone TE49:
- SO2 TE43C:
- TDLAS (NIR) CH4:
- TDLAS (NIR) CO2:

- FAGE:
- Formaldehyde:
- NOx FAAM:
- NOxy:
- ORAC:
- PAN:
- PERCA:
- Peroxide:
- PTRMS:
- TDLAS (1C):
- WAS Bags:
- WAS Bottles:

Misc Non-Core
- CASI/ATM:
- LIDAR:
- LTI:
- SAW Hygrometer:

Report Created 11/12/2008 16:37:36

Last Updated: 19/09/2008 07:50:00

Faults / Incidents Log

Flight No. B401
Date: 17/09/08

Instruments

1. 2DP – lots of noise after take-off
2. Wet Neph – Labview froze in first profile, restarted software but kept freezing.
3. Water droplets on AFC window at 1417Z, 3k'. Didn't appear to fly through cloud although cloud around. Water on inside of window?
4. PCASP – noise dropped off around 1520Z
5. CPC – could not get AIM software to run, i.e. would not go past Error messages "The parameter is not correct" and MFC Application Error. Shutdown at 1600Z.
6.

CVI -
Neph – no comms with chiller
PSAP -
SWS -
SHIMS -
AMS / SP2 -
Core Chem -
Cloud physics -
FWVS,TAFTS, AVAPS, ARIES, MARSS, DEIMOS – not operated

Aircraft

ISDN Emails
Nil

MPDS
Nil

Satcom-H Calls
Nil

Issues
Nil

Post Flight - Turb Probe Water Traps

1. Indicate Amount of Water: a) Nil b) 1-2 drops c) ¼ full or more d) Ice present
2. Emptied by:
3. Dried by

MISSING LOG SHEETS:

The following log sheets are not available for flight B401:

Log	Reason
Pre-flighter log	No log available
Core Chemistry / TDLAS	no In Flight log except in cases of instrument problems
AMS / SP2 log	AMS / SP2 operator does not create a log sheet
TAFTS	TAFTS operator does not create a log sheet
CVI	Jeff: no log to be found on instrument laptop - could be misfiled

AMS - not yet fitted

Document control

Revision	Date	Author	Comments
r0	08 Sep 2009	Doug Anderson	Initial version missing the above noted logs
r1			
r2			

VIDEO RECORDINGS:

The following video recordings in avi format should be available at the BADC :

faam-video-dfc_faam_20080918_r0_b401_133453_1hz.avi
faam-video-dfc_faam_20080918_r0_b401_143453_1hz.avi
faam-video-dfc_faam_20080918_r0_b401_153453_1hz.avi
faam-video-dfc_faam_20080918_r0_b401_163453_1hz.avi

faam-video-rfc_faam_20080918_r0_b401_133448_1hz.avi
faam-video-rfc_faam_20080918_r0_b401_143448_1hz.avi
faam-video-rfc_faam_20080918_r0_b401_153448_1hz.avi
faam-video-rfc_faam_20080918_r0_b401_163448_1hz.avi

faam-video-ffc_faam_20080918_r0_b401_133447_1hz.avi
faam-video-ffc_faam_20080918_r0_b401_143447_1hz.avi
faam-video-ffc_faam_20080918_r0_b401_153447_1hz.avi
faam-video-ffc_faam_20080918_r0_b401_163447_1hz.avi

faam-video-ufc_faam_20080918_r0_b401_133451_1hz.avi
faam-video-ufc_faam_20080918_r0_b401_143451_1hz.avi
faam-video-ufc_faam_20080918_r0_b401_153451_1hz.avi
faam-video-ufc_faam_20080918_r0_b401_163451_1hz.avi

No Digital8 video recordings were made on this flight.